

# STIC Search Report

## EIC 2800

STIC Database Tracking Number 138991

TO: Eric Thomas  
Location: JEF-10D20  
12/8/2004  
AU 2831  
Case Serial No. : 10/733,265

From: Jeff Harrison  
Location: STIC-EIC2800  
JEF-4B68  
Phone: 22511

Email: harrison, jeff

### Search Notes

Dear Examiner Thomas:

Re: Silicone structure; metal salt; benzophenone backbone; solid electrolyte

Attached are edited results from subject-searching in the patent and nonpatent literature, mostly from Chemical Abstracts.

I tagged a few worth your review, but I suggest that you browse the entire stack of results.

I found a silicone + benzophenone, but not all these together:

(silicone + benzophenone + metal salt + solid electrolyte + baked/heated)

If you'd like explanation or additional searching, let me know.

Respectfully,  
Jeff

Jeff Harrison  
Team Leader, STIC-EIC2800  
JEF-4B68, 571-272-2511

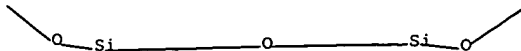
except in  
US 2004066606  
from same applicant.  
(different serial #)  
Results  
limited to art  
older than the  
12/18/2002 priority date.

CAS/STN FILE 'REGISTRY' ENTERED AT 14:17:07 ON 07 DEC 2004

L1 STRUCTURE UPLOADED



L2 50 SEA SSS SAM L1  
 L3 10128 S BENZOPHENON?  
 L5 STRUCTURE UPLOADED



L6 26 SEA SSS SAM L5  
 L7 1 S SILICONE/CN  
 L8 1998 S SILICONE OR POLYSILICONE  
 L9 1 S SILOXANE/CN  
 L10 0 S L9 NOT L7  
 L11 25829 S (SILOXANE OR POLYSILOXANE) AND C/ELS AND O/ELS  
 L12 22 S (L7 OR L8) AND C/ELS AND O/ELS  
 L13 90320 SEA SSS FUL L1  
 L14 1024 SEA SSS FUL L5

FILE 'HCAPLUS' ENTERED AT 14:28:44 ON 07 DEC 2004

L15 906 S L14  
 L16 75221 S L13  
 L17 29487 S L12  
 L18 44113 S L11  
 L19 29964 S L8  
 L20 61533 S L3  
 L21 83990 S L20 OR L16  
 L22 56493 S L15 OR L17 OR L18 OR L19  
 L23 1699 S L21 AND L22  
 L24 28717 S SOLID(3W)ELECTROLYTE  
 L25 1 S L23 AND L24  
 L26 25 S L23 AND THIN FILM  
 L27 12 S L23 AND ELECTROLYT#####  
 L28 0 S L26 AND L27  
 L29 0 S (L26 OR L27) AND BAK####  
 L30 15 S (L26 OR L27) AND (OVEN OR FURNACE OR ANNEAL##### OR RTA OR RTP OR HEAT##### OR THERMAL## OR TEMPERATURE(3A) (RAMP#### OR RAIS#### OR INCREAS##### OR ELEVAT#####))  
 L31 15 S L30 NOT L25  
 L32 6 S L15 AND THIN FILM  
 L33 3 S L15 AND ELECTROLYT#####  
 L34 229 S L15 AND (BAK#### OR OVEN OR FURNACE OR ANNEAL##### OR RTA OR RTP OR THERMAL### OR TEMPERATURE)  
 L35 16 S L15 AND BAK####  
 L36 495 S L22 AND ELECTROLYT#####  
 L37 1185 S L22 AND THIN FILM  
 L38 614 S L22 AND BAK###  
 L39 212 S L22 AND CAPACITOR  
 L40 71196 S METAL###(W)SALT  
 L41 14685 S (LI OR LITHIUM) (2W)SALT  
 L42 73 S (L25 OR L26 OR L27 OR L28 OR L29 OR L30 OR L31 OR L32 OR L33 OR L34 OR L35 OR L36 OR L37 OR L38 OR L39) AND (L40 OR L41)  
 L43 SEL PLU=ON L42 1- RN : 1050 TERMS

FILE 'REGISTRY' ENTERED AT 14:41:23 ON 07 DEC 2004

L44 1051 S L43  
 L45 162 S L44 NOT C/ELS  
 L46 113 S L44 AND LI/ELS  
 L47 252 S (L45 OR L46)

FILE 'HCAPLUS' ENTERED AT 14:42:49 ON 07 DEC 2004

L48 67 S L42 AND L47  
 L49 596 S L22 AND (L40 OR L41)  
 L50 6 S L49 AND THIN FILM  
 L51 16 S L49 AND SOLID ELECTROLYTE  
 L52 7 S L49 AND BAK####  
 L53 51 S L48 AND ELECTROLYTE  
 L54 5 S L48 AND CAPACITOR  
 L55 16 S L48 AND SOLID ELECTROLYTE  
 L56 6 S L48 AND BAK###  
 L57 16 S L25 OR L31  
 L58 53 S (L32 OR L33) OR L35 OR (L50 OR L51 OR L52) OR (L54 OR L55 OR L56)  
 L59 1 S L53 AND L21  
 L60 54 S (L58 OR L59) NOT L57

FILE 'HCAPLUS' ENTERED AT 14:42:49 ON 07 DEC 2004

```

L61      0 S L60 AND POLYSILICONE
L62      18 S L60 AND ?SILICONE?
L63      17 S (L44 OR L45 OR L46 OR L47) AND L62
L64      18 S (L62 OR L63)
L65      36 S L60 NOT (L64 OR L57)
L66      26 S L65 AND (CAPACITOR OR SOLID ELECTROLYTE OR BAK#### OR PREBAK####)
L67      10 S L65 AND (ULTRATHIN##### OR THIN##### OR MEMBRAN#####)
L68      35 S (L66 OR L67)
L69      36 S (L65 OR L66 OR L67 OR L68)
L70      0 S L14 AND ((L40 OR L41) OR L47) AND ELECTROLYT##### AND BAK#####
L71      2 S L14 AND ((L40 OR L41) OR L47) AND ELECTROLYT#####
L72      4 S L14 AND ((L40 OR L41) OR L47) AND BAK#####
L73      5 S L14 AND ((L40 OR L41) OR L47) AND THIN FILM
L74      1 S L14 AND ((L40 OR L41) OR L47) AND MEMBRANE
L75      0 S L14 AND ((L40 OR L41) OR L47) AND CAPACITOR
L76      70 S L69 OR L64 OR L57
L77      1 S (L71 OR L72 OR L73 OR L74) NOT L76
L78      232 S (("HEAT TREATMENT"/CT OR "THERMAL TREATMENT"/CT OR ANNEALING/CT OR . . . /CT) AND L14
L79      4 S L78 AND L21
L80      0 S L78 AND SOLID(4A)ELECTROLYT#####
L81      0 S L78 AND (MEMBRAN##### OR LAYER#### OR COAT#### OR LAMINA##### OR MULTILAYER##### OR
        SUBLAYER#### OR SUBCOAT####) (4A)ELECTROLYT#####
L82      1 S L78 AND ELECTROLYT#####
L83      76 S L78 AND ((L40 OR L41) OR L47)
L84      1 S L78 AND CAPACITOR
L85      0 S L78 AND CHARG####(2A)STOR####
L86      0 S L78 AND BATTERY
L87      0 S L78 AND FUELCELL
L88      0 S L78 AND FUEL CELL
L89      2 S L83 AND (L21 OR BENZOPHENON?)
L90      71 S L76 OR L77
L91      6 S (L79 OR L80 OR L81 OR L82) OR (L84 OR L85 OR L86 OR L87 OR L88 OR L89)
L92      4 S L91 NOT L90
L93      4871 S NIPPON PAINT?/CS,PA
L94      274 S OHATA M?/AU,IN
L95      529 S MATSUMURA A?/IN,AU
L96      2 S (L93 OR L94 OR L95) AND L15
L97      63 S (L93 OR L94 OR L95) AND L16
L98      59 S (L40 OR L41) AND (L93 OR L94 OR L95)
L99      2 S L97 AND L98
L100     4 S L96 OR L99

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FILE 'WPIX' ENTERED AT 15:09:34 ON 07 DEC 2004

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L101     17737 S (G100(P)J581(P)M150(P)M414(P)M532)/M0,M2,M3,M4
L102     12026 S L101(P)(M121(P)M131)/M2,M3,M4
L103     7926 S L102(P)(M280(P)M320)/M2,M3,M4
L104     6741 S L103(P)(G010(P)G019)/M2,M3,M4
L105     1834 S L101(P)M900/M0 OR L102(P)M901/M2,M3,M4 OR L103(P)M902/M2,M3,M4
L106     7272 S L105 OR L104
L107     4794 S L106(NOTP)(H1 OR H2 OR H3 OR H4 OR H5 OR H6 OR H7 OR H8 OR H9 OR J0)/M2,M3,M4
L108     3745 S L107(NOTP)(J1 OR J2 OR J3 OR J4 OR J6 OR J9 OR K0)/M2,M3,M4
L109     683 S (B414(P)B713(P)B760(P)B832(P)M411(P)M620(P)(B790 OR B798))/M0,M2,M3,M4
L110     238 S L108(P)(B720(P)M510(P)M520(P)M530(P)M540)/M2,M3,M4
L111     366 S L109(P)(M211(P)M282(P)M320(P)(M270 OR M272))/M2,M3,M4
L112     258 S L111(P)M900/M0 OR L109(P)M901/M2,M3,M4 OR L110
L113     255 S (L101 OR L102 OR L103 OR L104 OR L105 OR L106 OR L107 OR L108) AND (L109 OR L110 OR L111 OR L112)
L114     16 S L113 AND BENZOPHENON?
L115     7 S L113 AND ?SILICONE?
L116     0 S (L114 OR L115) AND ELECTROLYT#####
L117     0 S (L114 OR L115) AND CAPACITOR
L118     1 S (L114 OR L115) AND THIN FILM
L119     0 S (L114 OR L115) AND MEMBRAN#####
L120     0 S (L114 OR L115) AND BAK####
L121     0 S (L114 OR L115) AND (LI OR LITHIUM OR METAL####(2A)SALT)
L122     919 S (L109 OR L110 OR L111 OR L112 OR L113 OR L114 OR L115)
L123     3 S L122 AND SOLID####(2A)ELECTROLYT#####
L124     20 S L122 AND THIN FILM
L125     10 S L122 AND BAK####
L126     7 S (L123 OR L124 OR L125) AND ?SILICONE?
L127     2 S (L123 OR L124 OR L125) AND BENZOPHENON?
L128     2 S (L123 OR L124 OR L125) AND (PEROXIDE OR H2O2)
L129     1 S (L123 OR L124 OR L125) AND CAPACITOR
L130     4 S (L123 OR L124 OR L125) AND STOR####
L131     1 S (L123 OR L124 OR L125) AND (LI OR LITHIUM OR METAL####(2A)SALT)
L132     20 S L123 OR L125 OR (L126 OR L127 OR L128 OR L129 OR L130 OR L131)
L133     19 S L132 NOT L118

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L1 FILE 'IFIPAT' ENTERED AT 12:21:07 ON 08 DEC 2004  
1 S US2967170/PN

FILE 'STNGUIDE' ENTERED AT 12:21:30 ON 08 DEC 2004

L2 FILE 'DPCI' ENTERED AT 12:22:00 ON 08 DEC 2004  
4 S (GB842674 OR DE1103333 OR US2967170)/PN.D  
L3 SEL L2 1- PRN : 16 TERMS

FILE 'HCAPLUS' ENTERED AT 12:22:19 ON 08 DEC 2004  
L4 14 S L3  
L5 0 S L4 AND ELECTROLYTE

08dec04 11:52:20 User259284 Session D2990.2

File 2:INSPEC 1969-2004/Nov W4  
(c) 2004 Institution of Electrical Engineers

Set	Items	Description
S1	28	SOLID() POLYMER() ELECTROLYTES/TI AND BASED/TI
S2	5	S1 AND LITHIUM/TI
S3	2	S1 AND SILOXANE
S4	56	AU='SMID, J.'
S5	0	S4 AND SILOXANE??
S6	1	S4 AND BASED/TI

File 94:JICST-EPlus 1985-2004/Oct W5  
(c)2004 Japan Science and Tech Corp(JST)

Set	Items	Description
S1	804	BENZOPHENON? OR DIPHENYL()KETON???? OR DIPHENYLKETON?
S2	12	S1 AND (POLYSILICONE??? OR SILICONE??? OR SILAN? OR SILAN????)
S3	1	S2 AND (LI OR LITHIUM OR SALT? ?)
S4	13	S1 AND PEROXID?
S5	2	S4 AND (LI OR LITHIUM OR SALT? ?)
S6	138	PEROXID? AND (POLYSILICONE??? OR SILICONE??? OR SILAN? OR SILAN????)
S7	1	S2:S6 AND ELECTROLYTE? ?

# 138991 **SEARCH REQUEST FORM Scientific and Technical Information Center • EIC2800**

Rev. 3/19/2004 This is an experimental format -- Please give suggestions or comments to Jeff Harrison, JEP-4B68, 272-2511.

Date 11-30-04 Serial # 10/733265 Priority Application Date \_\_\_\_\_  
 Your Name Eric Thomas Examiner # 76204  
 AU 2831 Phone 272-1985 Room 10D20  
 In what format would you like your results? Paper is the default. **PAPER** **DISK** **EMAIL**

If submitting more than one search, please prioritize in order of need.

The EIC searcher normally will contact you before beginning a prior art search. If you would like to sit with a searcher for an interactive search, please notify one of the searchers.

Where have you searched so far on this case?

Circle: USPT DWPI EPO Abs JPO Abs IBM TDB

Other: \_\_\_\_\_

What relevant art have you found so far? Please attach pertinent citations or Information Disclosure Statements. \_\_\_\_\_

What types of references would you like? Please checkmark:

Primary Refs \_\_\_\_\_ Nonpatent Literature \_\_\_\_\_ Other \_\_\_\_\_  
 Secondary Refs \_\_\_\_\_ Foreign Patents \_\_\_\_\_  
 Teaching Refs \_\_\_\_\_

What is the topic, such as the **novelty**, motivation, utility, or other specific facets defining the desired **focus** of this search? Please include the concepts, synonyms, keywords, acronyms, registry numbers, definitions, structures, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract and pertinent claims.

PG Pub is 20040125544 - silicone structure  
 - Benzophenone structure  
 - Solid electrolyte  
 -- has been made by baking a thin film  
 --- in which a silicon compound has a  
 metal salt  
 --- e.g. lithium salt  
 --- e.g. silicone cpd or polysilane  
 Preferably a capacitor electrolyte

## Staff Use Only

Searcher: Harrison  
 Searcher Phone: 22511  
 Searcher Location: STIC-EIC2800, JEP-4B68  
 Date Searcher Picked Up: 12-7-04  
 Date Completed: 12-8-04  
 Searcher Prep/Rev Time: 120  
 Online Time: 75

## Type of Search

Structure (#) 2 X  
 Bibliographic N  
 Litigation \_\_\_\_\_  
 Fulltext \_\_\_\_\_  
 Patent Family \_\_\_\_\_  
 Other DPCT

## Vendors

STN X  
 Dialog X  
 Questel/Orbit \_\_\_\_\_  
 Lexis-Nexis \_\_\_\_\_  
 WWW/Internet \_\_\_\_\_  
 Other \_\_\_\_\_

Not sure if date is good enough, but...

10/733,265 searched 12/7/2004

L133 ANSWER 2 OF 19 WPIX COPYRIGHT THE THOMSON CORP on STN

AN 2004-373515 [35] WPIX Full-text

DNN N2004-297068 DNC C2004-140539

TI Electricity accumulating element has pair of electrodes, and dielectric thin film and solid electrolyte thin film between electrodes.

IN OHATA, M; OKA, T; TSUSHIMA, H

PA (NIPA) NIPPON PAINT CO LTD

PI US 2004066606 A1 20040408 (200435)\* 5 H01G004-06

JP 2004128222 A 20040422 (200435) 9 H01G009-032

KR 2004030351 A 20040409 (200453) H01G009-07

PRAI JP 2002-290300 20021002

AB US2004066606 A UPAB: 20040603

NOVELTY - An electricity accumulating element comprises a pair of electrodes, and a dielectric thin film and a solid electrolyte thin film between the electrodes. The dielectric thin film is a metal oxide thin film.

USE - As electricity accumulating element.

ADVANTAGE - The inventive element has a large electrostatic capacity.

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The metal oxide thin film is a chromium oxide thin film obtained by subjecting a chromium nitrogen oxide thin film to heat treatment of 400-800 degrees C. The solid electrolyte thin film is a thin film obtained by firing a silicon-containing compound at at least 200 degrees C. Preferred Property: The metal oxide thin film has a thickness of 1-100 nm.

TECHNOLOGY FOCUS - POLYMERS - Preferred Component: The silicon-containing compound comprises polysilane that is soluble in organic solvent, or a silicone compound having a chemical structure represented by the general formula (I).

R1-R12 = 1-10C aliphatic hydrocarbon that may be substituted with halogen or glycidyloxy, 6-12C aromatic hydrocarbon or 1-8C alkoxy;

a, b, c, d = at least 0; and

a+b+c+d = at least 1.

It may further comprise a silicon compound, and peroxide or a benzophenone derivative having a benzophenone structure.

Same Assignee  
Ohata is same inventor

10/2/2002 priority

Same  
Silicone  
structure  
claimed  
as in

10/733,265

Background of Invention  
in the PG PUB  
discusses Li salt





US 20040066606A1

(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2004/0066606 A1****Ohata et al.**(43) **Pub. Date:****Apr. 8, 2004**(54) **ELECTRICITY ACCUMULATING ELEMENT**(30) **Foreign Application Priority Data**(75) **Inventors:** Masashi Ohata, Neyagawa-city (JP);  
Hiroshi Tsushima, Takatsuki-city (JP);  
Takeshi Oka, Kobe-city (JP)

Oct. 2, 2002 (JP) ..... 2002-290300

**Publication Classification****Correspondence Address:****Law Offices of Townsend & Banta**  
**Suite 900, South Building**  
**601 Pennsylvania Ave., N.W.**  
**Washington, DC 20004 (US)**(51) **Int. Cl.<sup>7</sup>** ..... **H01G 4/06**(52) **U.S. Cl.** ..... **361/524**(57) **ABSTRACT**

An electricity accumulating element comprising a pair of electrodes, and a dielectric thin film and a solid electrolyte thin film sandwiched between the electrodes, wherein the dielectric thin film is a metal oxide thin film such as a chromium oxide thin film. The metal oxide thin film preferably has a thickness of 1 to 100 nm, and is preferably a film obtained by subjecting to heat treatment at a temperature of 400 to 800° C. The solid electrolyte thin film is preferably a thin film obtained by firing a silicon-containing compound at a temperature of 200° C. or more.

(73) **Assignee:** Nippon Paint Co., Ltd.(21) **Appl. No.:** 10/673,373(22) **Filed:** Sep. 30, 2003

## ELECTRICITY ACCUMULATING ELEMENT

## BACKGROUND OF THE INVENTION

## [0001] 1. Field of the Invention

[0002] The present invention relates to an electricity accumulating element having a dielectric thin film and a solid electrolyte thin film between a pair of electrodes.

## [0003] 2. Description of Related Art

[0004] It is reported that electroconductivity is exhibited by causing a highly electron-accepting compound such as molecular iodine or antimony fluoride to act on a silicon compound having a Si—Si bond as a main structure, such as polysilane (for example, Synthetic Metal, vol. 94, p. 299 (1998)).

[0005] As a method for making the whole of an electricity accumulating element into a solid form, there is known a method of using, as an electrolyte, a polymer material wherein an alkali metal salt such as lithium sulfate or lithium perchlorate is dispersed in a polar polymer such as polyethylene oxide, the polymer material being called solid electrolyte.

[0006] However, polysilane electroconductive materials wherein a highly electron-accepting compound such as molecular iodine or antimony fluoride is caused to act are instable and are difficult to handle in the air. It is therefore impossible to apply the materials to industrially useful electronic devices, typical examples of which include an electric element, a sensor and a transistor.

[0007] In the case of polymer solid electrolytes, the ion conductivity thereof is smaller than that of liquid or gel-form electrolytes; therefore, batteries using the polymer solid electrolytes do not satisfy specification for practical batteries.

## SUMMARY OF THE INVENTION

[0008] An object of the present invention is to provide an electricity accumulating element having a large electrostatic capacity.

[0009] The present invention is an electricity accumulating element comprising a pair of electrodes, and a dielectric thin film and a solid electrolyte thin film sandwiched between the electrodes, wherein the dielectric thin film is a metal oxide thin film. The metal oxide thin film is preferably a chromium oxide thin film. The chromium oxide thin film is preferably a film obtained by subjecting a chromium nitrogen oxide thin film to heat treatment at a temperature of 400 to 800° C.

[0010] Examples of other metal oxide thin films include thin films made of oxides of lithium, calcium, magnesium, aluminum, zinc, yttrium, iridium, indium, cadmium, gadolinium, gallium, gold, silver, silicon, germanium, cobalt, samarium, zirconium, tin, strontium, cesium, cerium, selenium, tungsten, carbon, tantalum, titanium, iron, tellurium, copper, lead, niobium, nickel, platinum, vanadium, palladium, manganese, bismuth, and molybdenum. Oxides of alloy composed of two or more out of these metals may be used.

[0011] The thickness of the metal oxide thin film is preferably from 1 to 100 nm.

[0012] If the thickness of the metal oxide thin film is less than 1 nm, electricity may conduct through the thin film. If the thickness is more than 100 nm, the electrostatic capacity may become too small.

[0013] According to the present invention, an electricity accumulating element having a large electrostatic capacity can be produced by setting the metal oxide thin film between a pair of electrodes.

[0014] In the present invention, a solid electrolyte thin film is further set between the pair of electrodes. The solid electrolyte thin film in the present invention may be a thin film obtained by firing a silicon-containing compound at a temperature of 200° C. or more. The firing temperature of the silicon-containing compound is more preferably from 300 to 1500° C.

[0015] An example of the silicon-containing compound may be a compound comprising at least one selected from a polysilane which is soluble in organic solvent and a silicone compound. A preferable example of the silicon-containing compound is a compound comprising both of the polysilane and the silicone compound.

[0016] The following will describe the polysilane and the silicone compound.

## [0017] &lt;Polysilane&gt;

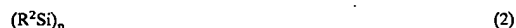
[0018] The polysilane used in the present invention is any polysilane that is a linear, cyclic or branched silane compound having a Si—Si bond. The category of the polysilane includes compounds which are called polysilanes.

[0019] Polysilane referred to herein is at least one polymer selected from the group consisting of linear polysilanes and cyclic polysilanes each having, in the chemical structure thereof, a main skeleton structure represented by the following general formula:



[0020] wherein  $R^1$ 's, which may be the same or different, are each a hydrogen atom, or an alkyl, alkenyl, arylalkyl, aryl, alkoxy, hydroxyl, hydroxyl-containing phenyl, amino or silyl group, and  $m$  is from 2 to 10000,

[0021] silicone network polymers each having, in the chemical structure thereof, a main skeleton structure represented by the following general formula:



[0022] wherein  $R^2$ 's, which may be the same or different, are each a hydrogen atom, or an alkyl, alkenyl, arylalkyl, aryl, alkoxy, hydroxyl, hydroxyl-containing phenyl, amino or silyl group, and  $n$  is from 4 to 10000, and

[0023] silicone network polymers each having, in the chemical structure thereof, a main skeleton structure represented by the following general formula:



[0024] wherein  $R^3$ 's, which may be the same or different, are each a hydrogen atom, or an alkyl, alkenyl, arylalkyl, aryl, alkoxy, hydroxyl, hydroxyl-containing phenyl, amino or silyl group, and the sum of  $x$ ,  $y$  and  $z$  is from 5 to 10000.

[0025] In the polysilanes represented by the general formulae (1), (2) and (3), examples of the alkyl moiety of the alkyl group or the arylalkyl group and the alkyl moiety of the

alkoxy group include linear, cyclic and branched aliphatic hydrocarbon groups having 1 to 14 carbon atoms, preferably 1 to 10, and more preferably 1 to 6. Examples of the alkenyl group include monovalent linear, cyclic and branched aliphatic hydrocarbon groups having at least one carbon-carbon double bond and having 1 to 14 carbon atoms, preferably 1 to 10 and more preferably 1 to 6 carbon atoms. Examples of the aryl moiety of the aryl group and the arylalkyl group include aromatic hydrocarbon groups which may have at least one substituent. Preferred is a phenyl or naphthyl group which may have at least one substituent. The kind of the substituent of the aryl moiety of the aryl group or the arylalkyl group is not particularly limited. The substituent is preferably at least one selected from the group consisting of alkyl, alkoxy, hydroxide, and amino groups.

[0026] The polysilane used in the present invention may have at least one hydroxyl group bonded directly to one or more Si atoms therein (i.e., a silanol group). The polysilane used in the present invention may have, on average per molecule thereof, one or more hydroxyl groups bonded directly to one or more Si atoms therein. The number of the hydroxyl groups contained in the polysilane is usually from about 0.01 to 3, preferably about 0.1 to 2.5, more preferably about 0.2 to 2 and most preferably about 0.3 to 1.5 on average per Si atom.

[0027] The method for introducing the hydroxyl groups to the polysilane may be any known method. For example, in a method of subjecting a halosilane to dehalogenation polycondensation or some other method, the introduction can easily be conducted by adding water to the reaction system at the time of the end of the polycondensation reaction.

[0028] There can also be used a silicon based polymer, containing a Si—Si bond, obtained by subjecting the above-mentioned polysilane to heat treatment at 300° C or more in the atmosphere of an inert gas such as nitrogen or argon, or in the air.

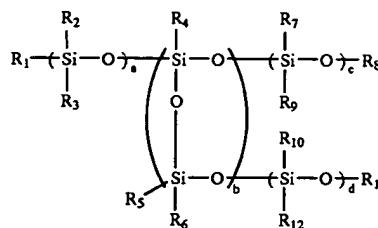
[0029] As the polysilane, a silicon network polymer having a network structure is preferably used.

[0030] As the polysilane, a network-form polysilane described in Japanese Patent Application Laid-Open (JP-A) No. 2001-48987 can be used. That is, there can be used a network-form polysilane produced by causing Mg or Mg alloy to act on trihalosilane in an aprotic solvent in the presence of a Li salt or a metal halide.

[0031] As the polysilane used in the present invention, a polysilane having a weight-average molecular weight of 1000 or more is preferred. If the weight-average molecular weight is less than 1000, properties of the resultant film, such as chemical resistance and heat resistance, may be insufficient. The weight-average molecular weight is more preferably from 1000 to 20000, still more preferably from 1000 to 10000.

[0032] <Silicone Compound>

[0033] An example of the silicone compound used in the present invention is a compound represented by the following general formula:



[0034] wherein  $R_1$  to  $R_{12}$ , which may be the same or different, are each a group selected from the group consisting of an aliphatic hydrocarbon which has 1 to 10 carbon atoms and may be substituted with a halogen or a glycidyloxy group, an aromatic hydrocarbon group having 6 to 12 carbon atoms, and an alkoxy group having 1 to 8 carbon atoms;  $a$ ,  $b$ ,  $c$  and  $d$  are each an integer of 0 or more; and  $a+b+c+d \geq 1$ .

[0035] Specific examples of the aliphatic hydrocarbon group which this silicone compound has include chain-form groups such as methyl, propyl, butyl, hexyl, octyl, decyl, trifluoropropyl, glycidyloxypropyl groups; and alicyclic groups such as cyclohexyl and methylcyclohexyl groups. Specific examples of the aromatic hydrocarbon group include phenyl, p-tolyl, and biphenyl groups. Specific examples of the alkoxy group include methoxy, ethoxy, phenoxy, octyloxy and tert-butoxy groups.

[0036] The kind of  $R_1$  to  $R_{12}$  and the values of  $a$ ,  $b$ ,  $c$  and  $d$ , which are not particularly important, are not particularly limited if the silicone compound is made compatible with the polysilane and organic solvent and the resultant film is made transparent. In the case of considering the compatibility, it is preferable that the silicone compound has the same hydrocarbon group as the used polysilane has. In the case of using a phenyl methyl type polysilane as the polysilane, it is preferable to use, for example, a silicone compound of the same phenyl methyl type or a biphenyl type. It is possible to use, as a crosslinking compound, a silicone compound having in a single molecule thereof two or more alkoxy groups, such as a silicone compound wherein at least two selected from  $R_1$  to  $R_{12}$  are alkoxy groups having 1 to 8 carbon atoms. Examples of such a silicone compound include methyl phenyl methoxysilicone and phenyl methoxysilicone containing 15 to 35% by weight of alkoxy groups.

[0037] The silicon-containing compound may further comprise a silicon compound and at least one selected from a peroxide and a benzophenone derivative having a benzophenone skeleton.

[0038] The solid electrolyte thin film in the present invention is not limited to the above, and other examples thereof include a thin film made of manganese dioxide, and a thin film made of an electroconductive polymer (such as polypyrrole).

[0039] The thickness of the solid electrolyte thin film in the present invention is not particularly limited. The thickness is preferably from 1 to 10000 nm.

[0040] Examples of the metal which can be used in the electrodes in the present invention include lithium, calcium, magnesium, aluminum, zinc, yttrium, iridium, indium, cadmium, gadolinium, gallium, gold, silver, chromium, silicon, germanium, cobalt, samarium, zirconium, tin, strontium, cesium, cerium, selenium, tungsten, carbon, tantalum, titanium, iron, tellurium, copper, lead, niobium, nickel, platinum, vanadium, palladium, manganese, bismuth, and molybdenum. Oxides of alloy composed of two or more out of these metals may be used. For the metal oxide thin film, oxides of the above-mentioned metals or alloys thereof can be used.

[0041] Examples of the electroconductive compound which can be used in the electrodes include electroconductive polymers such as polyacetylene, polythiophene, polyparaphenylene vinylene, polypyrrole, polyparaphenylene, polyacene, polythiazyl, polyparaphenylene sulfide, poly(2,5-thienylenevinylene) and polyfluorene; derivatives thereof; and aromatic amine derivatives and polymers thereof. These electroconductive organic compounds may be used alone or in a state that a doping agent such as iodine is incorporated thereto.

[0042] The electricity accumulating element of the present invention can be charged by applying a given voltage or electric current between the pair of electrodes. After the charging, this element can be used as a power supply by taking off the used battery charger and then making the element and a load up to a closed circuit.

#### DESCRIPTION OF PREFERRED EXAMPLES

[0043] The present invention will be described in detail by way of the following examples hereinafter, but the present invention is not limited to these examples.

##### Example 1

[0044] An electroconductive chromium compound thin film substrate, wherein a chromium nitrogen oxide thin film (thickness: 20 nm) and a chromium thin film (thickness: 15 nm) were alternately and repeatedly deposited so as to form a five-layer structure having one of the chromium nitrogen oxide thin films as the topmost layer, was subjected to heat treatment at 500° C. for 2 hours, so as to yield a heat-treated substrate. The composition of this heat-treated substrate in the depth direction from the topmost surface was analyzed by X-ray photoelectron spectroscopy. As a result, it was verified that a thin film made of a chromium oxide (Cr:O= about 1:1) and having a thickness of about 20 nm was present in the topmost surface. The topmost surface portion was made of an insulator having a resistance of 1 MΩ or more.

[0045] Next, the following was applied onto this heat-treated substrate: a silicon compound solution wherein 2 parts by weight of polymethylphenylsilane, 1 part by weight of polyalkylphenylsiloxane (silicone TSR-165, manufactured by GE Toshiba Silicone Co.), 0.3 part by weight of 3,3',4,4'-tetra-(t-butylperoxycarbonyl)benzophenone (BTTB-25, manufactured by NOF Corp.) and about 1/100 part by weight of a surfactant (R-08, manufactured by Dainippon Ink & Chemicals, Inc.) were dissolved in anisole

at a dark place. The applied solution was then dried. Thereafter, the resultant was fired at 550° C. for 30 minutes to produce a solid electrolyte thin film.

[0046] Next, aluminum was vacuum-evaporated onto this solid electrolyte thin film so as to produce a sandwich type test cell (apparent electrode area: 0.15 cm<sup>2</sup>) having a structure of aluminum/the silicon compound thin film (solid electrolyte thin film)/the chromium oxide (dielectric thin film)/the electroconductive chromium compound.

[0047] About the test cell obtained through the above-mentioned process, the electrostatic capacity thereof at 100 Hz was measured with an LCR meter. As a result, the electrostatic capacity was 0.23 μF. The electrostatic capacity per unit area is shown in Table 1.

##### Example 2

[0048] A sandwich type test cell was produced in the same way as in Example 1 except that a manganese dioxide thin film was formed instead of the silicon compound thin film as the solid electrolyte thin film. The manganese dioxide thin film can be formed by a known method.

[0049] About the test cell obtained through the above-mentioned process, the electrostatic capacity thereof at 100 Hz was measured with an LCR meter. As a result, the electrostatic capacity was 0.23 μF. The electrostatic capacity per unit area is shown in Table 1.

TABLE 1

	Electrostatic capacity (μF) per unit area
Example 1	1.5
Example 2	1.5
Comparative Example	0.1

##### Comparative Example

[0050] A sandwich type test cell was produced in the same way as in Example 1 except that the electroconductive chromium compound thin film substrate was used, as it was, without being heat-treated.

[0051] About the test cell obtained through the above-mentioned process, the electrostatic capacity thereof at 100 Hz was measured with an LCR meter. As a result, the electrostatic capacity was 0.05 μF. The electrostatic capacity per unit area is shown in Table 1.

[0052] As is evident from Table 1, it can be understood that the test cells of Examples 1 and 2 according to present invention had a far higher electrostatic capacity than the test cell of Comparative Example.

[0053] According to the present invention, an electricity accumulating element having a large electrostatic capacity can be produced. The electricity accumulating element of the present invention can widely be used as an element of various electronic devices, and has a very high industrial value.

What is claimed is:

1. An electricity accumulating element comprising a pair of electrodes, and a dielectric thin film and a solid electrolyte thin film sandwiched between the electrodes,

wherein the dielectric thin film is a metal oxide thin film.

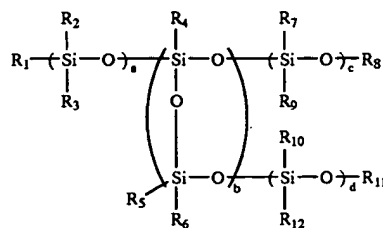
2. The electricity accumulating element according to claim 1, wherein the thickness of the metal oxide thin film is from 1 to 100 nm.

3. The electricity accumulating element according to claim 1, wherein the metal oxide thin film is a chromium oxide thin film.

4. The electricity accumulating element according to claim 3, wherein the chromium oxide thin film is a film obtained by subjecting a chromium nitrogen oxide thin film to heat treatment at a temperature of 400 to 800° C.

5. The electricity accumulating element according to claim 1, wherein the solid electrolyte thin film is a thin film obtained by firing a silicon-containing compound at a temperature of 200° C. or more.

6. The electricity accumulating element according to claim 5, wherein the silicon-containing compound comprises at least one selected from a polysilane which is soluble in organic solvent and a silicone compound having a chemical structure represented by the general formula:



wherein  $R_1$  to  $R_{12}$ , which may be the same or different, are each a group selected from the group consisting of an aliphatic hydrocarbon which has 1 to 10 carbon atoms and may be substituted with a halogen or a glycidyloxy group, an aromatic hydrocarbon group having 6 to 12 carbon atoms, and an alkoxy group having 1 to 8 carbon atoms;  $a$ ,  $b$ ,  $c$  and  $d$  are each an integer of 0 or more; and  $a+b+c+d \geq 1$ .

7. The electricity accumulating element according to claim 6, wherein the silicon-containing compound further comprises a silicon compound and at least one selected from a peroxide and a benzophenone derivative having a benzophenone structure.

\* \* \* \* \*

Re: Claim 4

10/733,265 searched 12/7/2004

L69 ANSWER 5 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2004:18146 DN 140:79779 ED Entered STN: 09 Jan 2004  
 TI Ionic conductors, and secondary batteries using them as solid electrolytes  
 IN Iio, Keiichi; Yoshihara, Toshiaki  
 PA Toppan Printing Co., Ltd., Japan

5/31/02  
 JP priority

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004006114	A2	20040108	JP 2002-159935	20020531
PRAI JP 2002-159935		20020531		

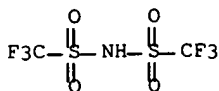
1/8/04 JP pub.

AB The ionic conductors contain (A) organic-inorg. composite polymers prepared by hydrolysis-polycondensation of starting materials containing organic compds. R1aM1(OR2)4-a [M1 = (non)metal; R1 = organic functional group; R2 = CH2h+1; h = 1-5; a = 1-3] and (B) alkali metal salts M2X (M2 = alkali metal; X = anion). The ionic conductors show good flexibility and are suitable for solid electrolytes having separator functions for secondary batteries.

IT RL: (Device component use); (Industrial manufacture); (Technical or engineered material use); (Preparation); (Uses) (organic-inorg. composite polymer ionic conductors for secondary battery electrolytes and separators)

RN 90076-65-6 HCAPLUS

CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (9CI) (CA INDEX NAME)

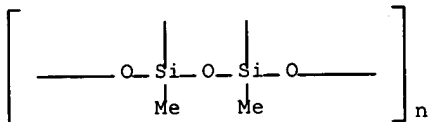


● Li

b = 1  
 a, c, d = 0

RN 153315-80-1 HCAPLUS

CN Poly[(1,3-dimethyl-1,3:1,3-disiloxanediylidene)-1,3-bis(oxy)] (9CI)



need another  
 C-si  
 substituent

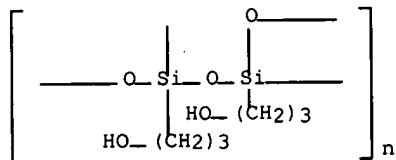
RN 162477-44-3 HCAPLUS

CN Poly[[1,3-bis[3-(oxiranylmethoxy)propyl]-1,3:1,3-disiloxanediylidene]-1,3-bis(oxy)] (9CI) (CA INDEX NAME)

\* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT \*

RN 639819-48-0 HCAPLUS

CN Poly[[1,3-bis(3-hydroxypropyl)-1,3:1,3-disiloxanediylidene]-1,3-bis(oxy)]



Claim 1 ok but  
 No heating?

## L25 ANSWER 1 OF 1 HCAPLUS COPYRIGHT ACS on STN

AN 2003:591393 DN 139:150738 ED Entered STN: 01 Aug 2003

TI Acid-base proton conducting polymer blend membrane for fuel cells

IN Nam, Kiehyun; Xu, Helen; Cao, Shuguang; Olmeijer, David; Servaites, Jon; Wang, Ying

PA Polyfuel, Inc., USA

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003062493	A1	20030731	WO 2003-US2361	20030123
US 2003219640	A1	20031127	US 2003-351257	20030123
EP 1476589	A1	20041117	EP 2003-705924	20030123
<b>PRAI US 2002-351445P</b>	<b>P</b>	<b>20020123</b>		
WO 2003-US2361	W	20030123		

AB The acid-base proton conducting polymer blend membrane comprises a first acidic polymer having acidic subunits, a second basic polymer having basic subunits, and a third polymer containing one or more functional units for improving membrane conductivity, flexibility, water remaining ability, dimension stability, and methanol crossover. In one embodiment, the acid-base polymer blend membrane of the present invention comprises a first acidic polymer having acidic subunits, a second basic polymer having basic subunits, wherein at least one of the first acidic and second basic polymer comprises one or more functional units to improve the properties of the membrane. The functional units include hydrophilic units, adhesion promoter units, methanol block units, dimensional stabilizer units, and flexible units. Optionally, interpenetrating polymer networks are added to the blends to improve the membrane dimensional stability, and rubbers are optionally added to the blends to improve the membrane mech. properties and reduce methanol permeability. A typical membrane was manufactured by adding 0.2 g NH<sub>3</sub> to 12 g AcNMe<sub>2</sub> containing 0.7 g sulfonated PEEK, adding 0.3 g styrene-4-vinylpyridine block copolymer (number-average mol. weight vinylpyridine block 80,000, number-average mol. weight styrene block 160,000), casting, drying, soaking 16 h in 1.5 M H<sub>2</sub>SO<sub>4</sub>, and rinsing in water.

(1) de Nora; US 4295952 A 1981 HCAPLUS

(2) Formato; US 6248469 B1 2001 HCAPLUS

(3) Prakash; US 6444343 B1 2002 HCAPLUS

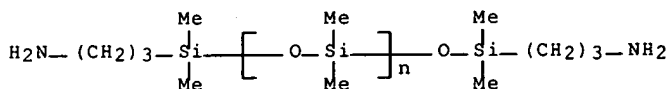
(4) Zupncic; US 4664761 A 1987 HCAPLUS

IT 97917-34-5, A 12

(DMS-A 12, mech.-property improving component; acid-base proton conducting polymer blend membrane with good mech. properties, hydrophilicity, and decreased methanol permeability for fuel cells)

RN 97917-34-5 HCAPLUS

CN Poly[oxy(dimethylsilylene)],  $\alpha$ -[(3-aminopropyl)dimethylsilyl]-  
 $\omega$ -[(3-aminopropyl)dimethylsilyl]oxy)- (9CI) (CA INDEX NAME)

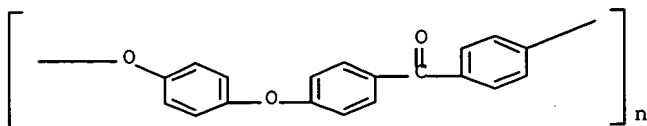


IT 31694-16-3D, PEEK, sulfonated, ammonium salts

(acid polymer; acid-base proton conducting polymer blend membrane with good mech. properties, hydrophilicity, and decreased methanol permeability for fuel cells)

RN 31694-16-3 HCAPLUS

CN Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene)



Benzophenone  
deriv

No heating?

But no  
metal salt

L69 ANSWER 6 OF 36 HCAPLUS COPYRIGHT ACS on STN  
 AN 2003:836471 DN 139:338608 ED Entered STN: 24 Oct 2003  
 TI Crosslinked polysiloxanes  
 IN West, Robert C.; Zhang, Zheng-Cheng  
 PATENT NO. KIND DATE APPLICATION NO. DATE

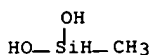
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2003198869	A1	20031023	US 2003-367013	20030213
	WO 2003090299	A1	20031030	WO 2003-US8784	20030320
PRAI	US 2002-374374P	P	20020422		
	US 2003-367013	A	20030213		

AB Disclosed herein are crosslinked polysiloxane polymers having oligooxyethylene side chains. Lithium salts of these polymers are synthesized as liqs. and then caused to solidify in the presence of elevated temps. to provide a solid electrolyte useful in lithium batteries. A typical crosslinkable polymer was manufactured by heating 30 g polymethylhydrosiloxane 24 h at 60° in PhMe with 102 g triethylene glycol allyl Me ether in the presence of Pt-divinyltetramethyldisiloxane complex catalyst.

IT 49718-23-2DP, Methylhydrogensilanediol homopolymer, reaction products with triethylene glycol allyl Me ether (assumed monomers, crosslinkable; crosslinked polysiloxanes having oligooxyethylene side chains as lithium salts for batteries)

RN 49718-23-2 HCAPLUS  
 CN Silanediol, methyl-, homopolymer (9CI) (CA INDEX NAME)

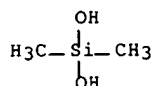
CM 1  
 CRN 43641-90-3  
 CMF C H6 O2 Si



IT 31900-57-9D, Dimethylsilanediol homopolymer, bis(allyldimethylsilyl)-terminated (assumed monomers, crosslinker; crosslinked polysiloxanes having oligooxyethylene side chains as lithium salts for batteries)

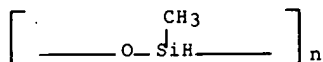
RN 31900-57-9 HCAPLUS  
 CN Silanediol, dimethyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1  
 CRN 1066-42-8  
 CMF C2 H8 O2 Si



IT 9004-73-3DP, Poly[oxy(methylsilylene)], reaction products with triethylene glycol allyl Me ether (crosslinkable; crosslinked polysiloxanes having oligooxyethylene side chains as lithium salts for batteries)

RN 9004-73-3 HCAPLUS  
 CN Poly[oxy(methylsilylene)] (8CI, 9CI) (CA INDEX NAME)



IT 90076-65-6, Lithium bis(trifluoromethanesulfonyl)imide (crosslinked polysiloxanes having oligooxyethylene side chains as lithium salts for batteries)

RN 90076-65-6 HCAPLUS  
 CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt

Claim 1 OK, but  
 For Claim 4  
 need a  
 third  
 C-Si  
 substituent

a or c or d = 1  
~~b~~ b = 0



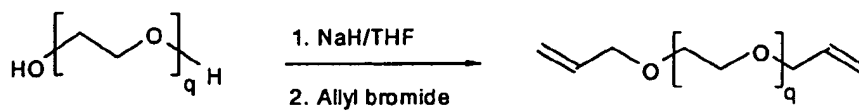


Figure 3

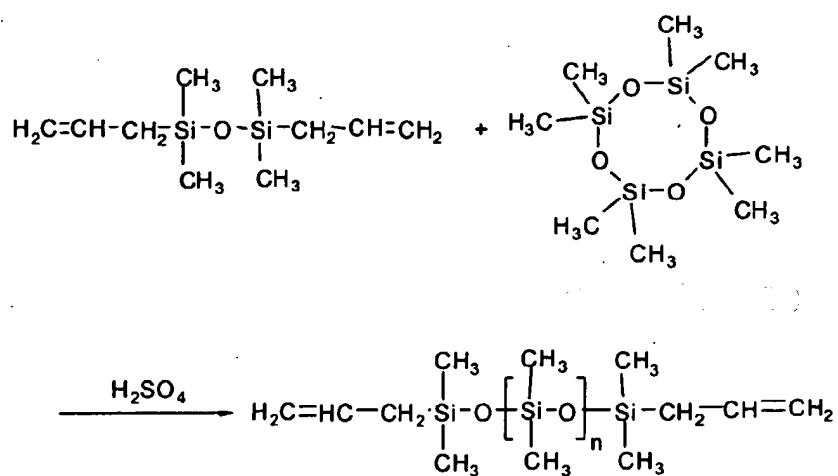


Figure 4

L69 ANSWER 8 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2003:755131 HCAPLUS Full-text

DN 139:269321

ED Entered STN: 26 Sep 2003

TI Separator for electrolytic capacitor

IN Tsukuda, Takahiro; Takaoka, Kazuchiyo; Hyodo, Kenji

PA Mitsubishi Paper Mills, Ltd., Japan

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003272952	A2	20030926	JP 2002-76381	20020319

PI JP 2003272952 A2 20030926 JP 2002-76381 20020319

PRAI JP 2002-76381 20020319

AB A heat-resistant separator for an electrolytic capacitor comprises a porous substrate modified with a silicate  $\text{SinOn-1(OR)2n+2}$ , where R = H, alkali metal, alkaline earth metal, (un)substituted C1-18 alkyl, (un)substituted C7-21 aralkyl, or (un)substituted C6-20 aryl, and  $n \geq 2$ .

IT Electrolytic capacitors

Porous materials

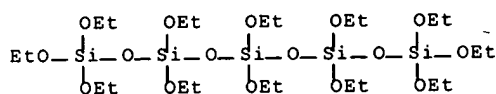
(silicate-modified separator for electrolytic capacitor)

IT 4935-68-6 17988-16-8

(silicate-modified separator for electrolytic capacitor)

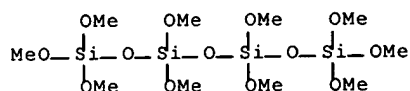
RN 4935-68-6 HCAPLUS

CN Pentasiloxane, dodecaethoxy- (9CI) (CA INDEX NAME)



RN 17988-16-8 HCAPLUS

CN Tetrasiloxane, decamethoxy- (9CI) (CA INDEX NAME)



L69 ANSWER 7 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2003:797068 DN 139:310053 ED Entered STN: 10 Oct 2003

TI Polymer **electrolyte** for rechargeable electrochemical cell

IN West, Robert; Wang, Qingzheng; Amine, Khalil

PA Quallion LLC, USA

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003083973	A1	20031009	WO 2003-US8779	20030320
	US 2003180624	A1	20030925	US 2002-104352	20020322
	US 2003180625	A1	20030925	US 2002-167940	20020612
	WO 2003083970	A1	20031009	WO 2003-US2127	20030122
	WO 2003083971	A1	20031009	WO 2003-US2128	20030122
	US 2004214090	A1	20041028	US 2004-491071	20040326
PRAI	US 2002-104352	A	20020322		
	US 2002-167940	A	20020612		
	WO 2003-US2127	A	20030122		
	WO 2003-US2128	A	20030122		
	US 2003-443892P	P	20030130		
	US 2003-446848P	P	20030211		
	US 2003-451065P	P	20030226		
	WO 2003-US8779	W	20030320		

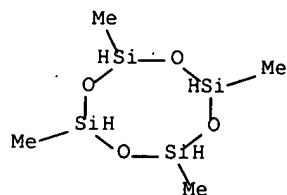
AB Disclosed is a cyclic siloxane polymer **electrolyte** for use in lithium electrochem. storage devices such as secondary batteries and **capacitors**. **Electrolyte** polymers comprising poly(siloxane-g-ethylene oxides) with one or more poly(ethylene oxide) side chains directly bonded to Si atoms are convenient to synthesize, have a long shelf life, have a wide electrochem. stability window of over 10-4 S/cm at room temperature, do not evaporate up to 150°, have a wide electrochem. stability window of over 4.5 V (vs. lithium), and are not flammable. Viscosity and conductivity can be optimized by controlling the size of siloxane ring or the length of poly(ethylene oxide) side chain. The polymer disclosed may also be used in **solid electrolyte** applications by use of solidifying agents or entrapping within solid polymers. Means to synthesize both 8 and 10 membered rings are described using both boron and triethylamine as catalysts.

IT **Capacitors**

IT 2370-88-9, Tetramethylcyclotetrasiloxane 6166-86-5, Pentamethylcyclopentasiloxane (polymer **electrolyte** for rechargeable electrochem. cell)

RN 2370-88-9 HCAPLUS

CN Cyclotetrasiloxane, 2,4,6,8-tetramethyl-



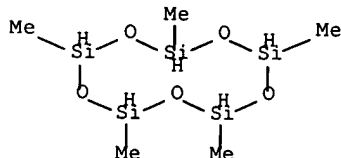
Claim 1  
structures

US 20030180624  
says

"Solidify in Oven or  
Heating Medium"

RN 6166-86-5 HCAPLUS

CN Cyclopentasiloxane, 2,4,6,8,10-pentamethyl-



IT 7791-03-9, Lithium perchlorate

13537-32-1D, Fluorophosphoric acid, Li alkyl salt

14283-07-9, Lithium tetrafluoroborate

29935-35-1, Lithium hexafluoroarsenate

365460-35-1, Lithium trifluorotris(trifluoromethyl)phosphate

403699-22-9, Lithium trifluorotris(perfluoroethyl)phosphate

(polymer **electrolytes** containing cyclosiloxanes for rechargeable electrochem. cell)

21324-40-3, Lithium hexafluorophosphate

33454-82-9, Lithium triflate

RN 7791-03-9 HCAPLUS

CN Perchloric acid, lithium salt (8CI, 9CI) (CA INDEX NAME)

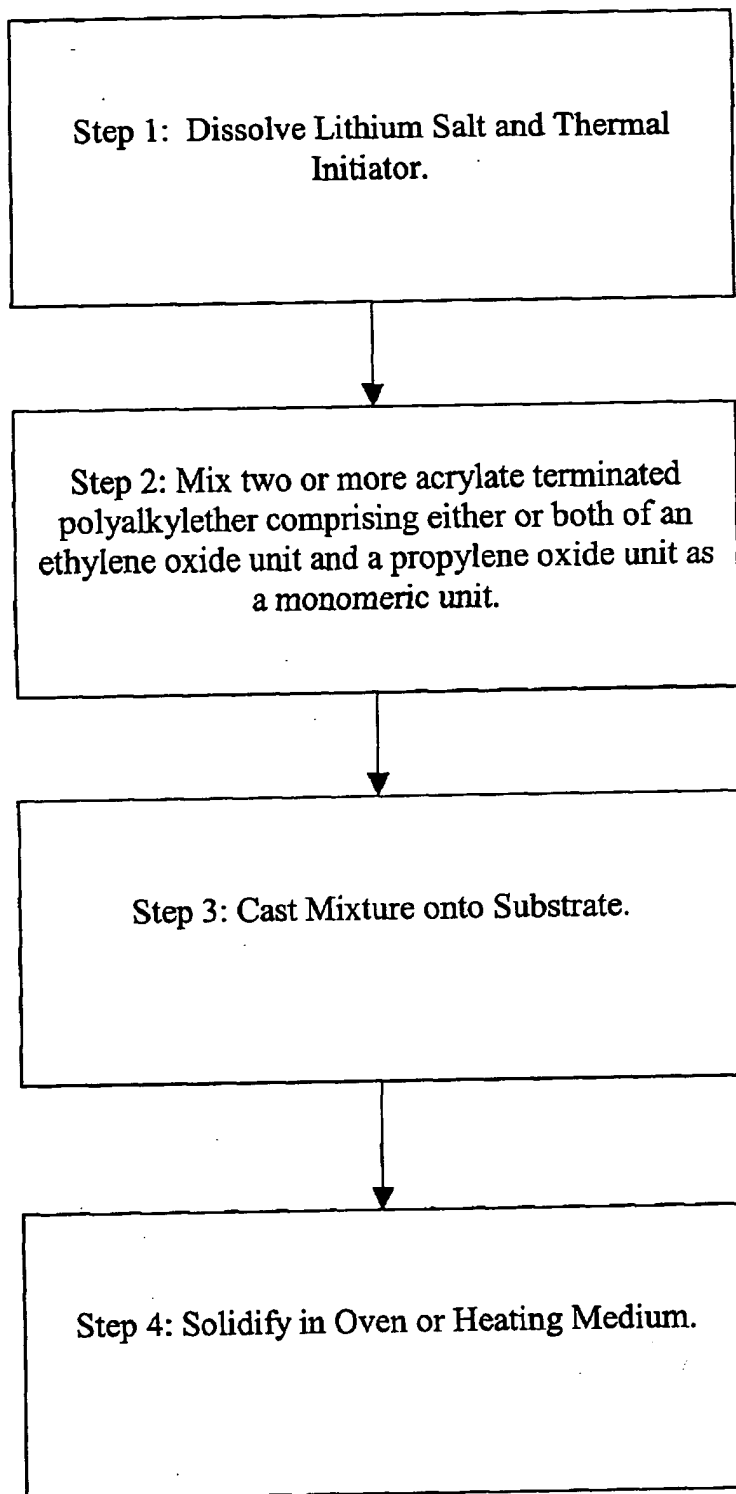
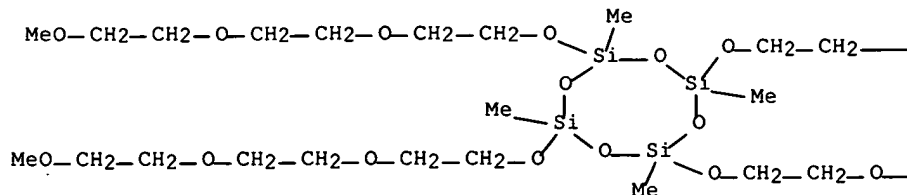


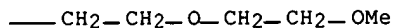
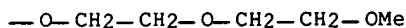
FIGURE 2

IT 117724-89-7P 612086-47-2P  
 (polymer electrolytes containing lithium compds. for rechargeable electrochem. cell)  
 RN 117724-89-7 HCAPLUS  
 CN Cyclotetrasiloxane, 2,4,6,8-tetrakis[2-[2-(2-methoxyethoxy)ethoxy]ethoxy]-  
 2,4,6,8-tetramethyl- (9CI) (CA INDEX NAME)

PAGE 1-A

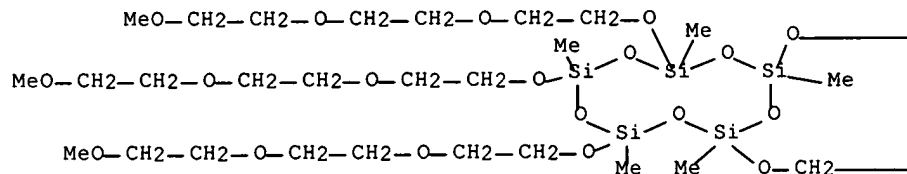


PAGE 1-B

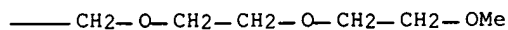
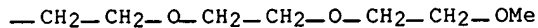


RN 612086-47-2 HCAPLUS  
 CN Cyclopentasiloxane, 2,4,6,8,10-pentakis[2-[2-(2-methoxyethoxy)ethoxy]ethoxy]-2,4,6,8,10-pentamethyl- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



L69 ANSWER 9 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2003:551208 DN 139:101535 ED Entered STN: 18 Jul 2003

TI Production of oxyalkylene-containing acrylate-terminated polysiloxane crosslinking agents

IN Kang, Yongku; Lee, Changjin; Lee, Won Sil; Noh, Kun Ae

PA Korea Research Institute of Chemical Technology, S. Korea

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 2003134968	A1	20030717	US 2002-282214	20021028
US 6783897	B2	20040831		
KR 2003040618	A	20030523	KR 2001-70969	20011115
JP 2003277506	A2	20031002	JP 2002-324866	20021108
PRAI KR 2001-70969	A	20011115		

AB A crosslinking agent comprises Me siloxane polymer backbone, a poly(alkylene oxide) branches and from 2 to 4 of acrylate groups at both terminals. A solid polymer electrolyte composition comprises (a) 0.1-80% of the crosslinking agent, (b) 0.1-80% of a plasticizer selected from poly(alkylene glycol) dialkyl ethers and non-aqueous polar solvents, (c) 3-30% of a lithium salt, and (d) 0.5-5% of a curing initiator. The crosslinkable solid polymer electrolyte composition has a high ionic conductivity at room temperature and can be readily formed into a film suitable for use in large-size lithium-polymer secondary batteries applicable to elec. cars, power storage devices for power leveling, as well as in small-size lithium-polymer secondary batteries applicable to video cameras and portable data terminals, such as cellular phones and notebook computers. Thus, tri(ethylene glycol) allyl Me ether was hydrosilylated with 2,4,6,8-tetramethylcyclotetrasiloxane in the presence of a platinum catalyst producing tetrafunctional tri(ethylene glycol)-substituted D4 monomer in 97.4% yield. The monomer was polymerized in the presence of 1,3-di(3-acryloyloxypropyl)-1,1,3,3-tetramethyldisiloxane terminating agent and sulfuric acid to obtain a polyoxyethylene-grafted acryloyloxy-terminated polysiloxane used as a crosslinkable component in solid polymer electrolyte compns.

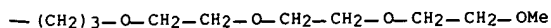
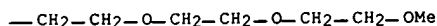
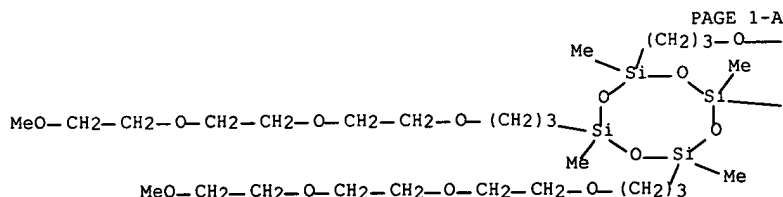
IT 7439-93-2D, Lithium, salts 7791-03-9

IT 131718-86-0P 362060-08-0P 561065-47-2P 561065-48-3P

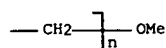
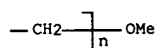
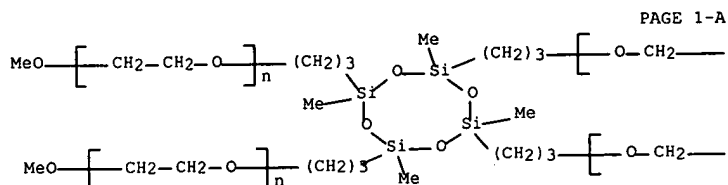
(monomer; production of oxyalkylene-containing acrylate-terminated polysiloxane crosslinking agents)

RN 131718-86-0 HCAPLUS

CN Cyclotetrasiloxane, 2,4,6,8-tetramethyl-2,4,6,8-tetrakis(4,7,10,13-tetraoxatetradec-1-yl)-



RN 362060-08-0 HCAPLUS

CN Poly(oxy-1,2-ethanediyl),  $\alpha, \alpha', \alpha'', \alpha'''$ —[(2,4,6,8-tetramethylcyclotetrasiloxane-2,4,6,8-tetra-yl)tetra-3,1-propanediyl]tetrakis( $\omega$ -methoxy-

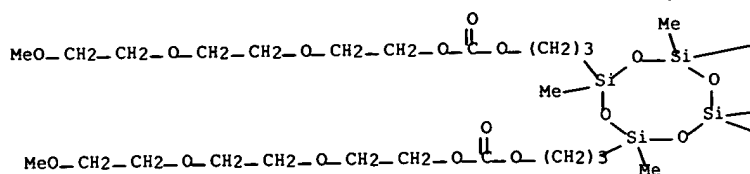
RN 561065-47-2 HCAPLUS CN 2,5,8,11-Tetraoxadodecanoic acid, (2,4,6,8-tetramethylcyclotetrasiloxane-2,4,6,8-tetra-yl)tetra-3,1-propanediyl ester

No baking mentioned?

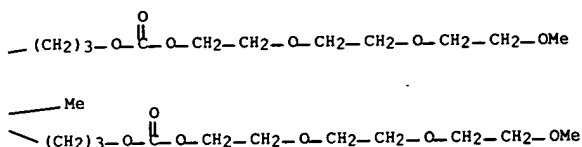
p. 1 of 5

a or c or d = 1  
b = 0

PAGE 1-A



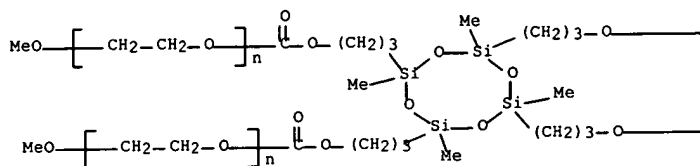
PAGE 1-B



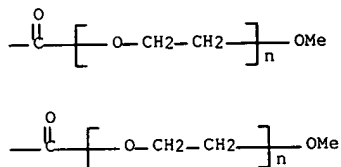
RN 561065-48-3 HCAPLUS

CN Poly(oxy-1,2-ethanediyl),  $\alpha, \alpha', \alpha'', \alpha'''$  - [(2,4,6,8-tetramethylcyclotetrasiloxane-2,4,6,8-tetrayl)tetrakis(3,1-propanediylloxycarbonyl)]tetrakis( $\omega$ -methoxy- (9CI) (CA INDEX NAME)

PAGE 1-A



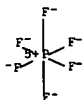
PAGE 1-B



IT 21324-40-3, Lithium hexafluorophosphate 33454-82-9,  
Lithium trifluoromethanesulfonate  
(oxyalkylene-containing acrylate-terminated polysiloxanes used in compns.  
for lithium secondary batteries)

RN 21324-40-3 HCAPLUS

CN Phosphate(1-), hexafluoro-, lithium (8CI, 9CI) (CA INDEX NAME)

● Li<sup>+</sup>

RN 33454-82-9 HCAPLUS

CN Methanesulfonic acid, trifluoro-, lithium salt (8CI, 9CI) (CA INDEX NAME)



● Li

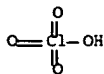
IT 7439-93-2D, Lithium, salts 7791-03-9  
, Lithium perchlorate 14283-07-9, Lithium tetrafluoroborate  
29935-35-1, Lithium hexafluoroarsenate 90076-65-6,  
Lithium bis(trifluoromethylsulfonyl)imide  
(oxyalkylene-containing acrylate-terminated polysiloxanes used in compns.  
for lithium secondary batteries)

RN 7439-93-2 HCAPLUS

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

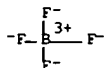
p. 2 of 5

RN 7791-03-9 HCAPLUS  
 CN Perchloric acid, lithium salt (8CI, 9CI) (CA INDEX NAME)



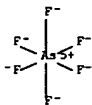
● Li

RN 14283-07-9 HCAPLUS  
 CN Borate(1-), tetrafluoro-, lithium (8CI, 9CI) (CA INDEX NAME)



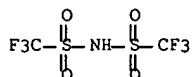
● Li<sup>+</sup>

RN 29935-35-1 HCAPLUS  
 CN Arsenate(1-), hexafluoro-, lithium (8CI, 9CI) (CA INDEX NAME)



● Li<sup>+</sup>

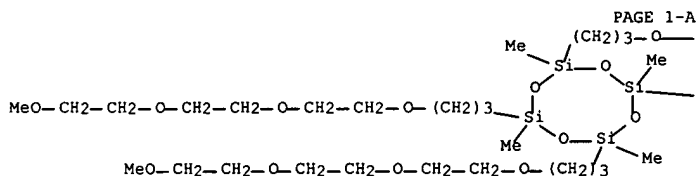
RN 90076-65-6 HCAPLUS  
 CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-, lithium salt (9CI) (CA INDEX NAME)



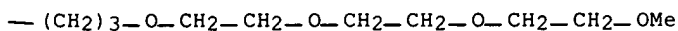
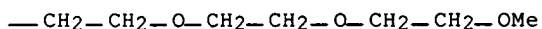
● Li

IT 561065-50-7DP, acryloyloxy-terminated 561065-52-9DP,  
 acryloyloxy-terminated 561065-55-2DP, acryloyloxy-terminated  
 (production of oxyalkylene-containing acrylate-terminated polysiloxane crosslinking agents)  
 RN 561065-50-7 HCAPLUS  
 CN Cyclotetrasiloxane, 2,4,6,8-tetramethyl-2,4,6,8-tetrakis(4,7,10,13-tetraoxatetradec-1-yl)-, homopolymer (9CI) (CA INDEX NAME)

CM 1  
 CRN 131718-86-0  
 CMF C44 H96 O20 Si4



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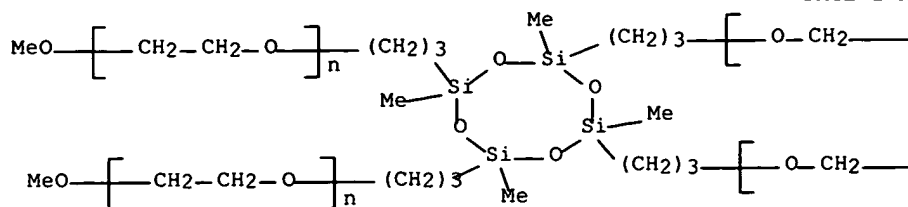
RN 561065-52-9 HCAPLUS  
 CN Poly(oxy-1,2-ethanediyl), α,α',α'',α'''-[(2,4,6,8-tetramethylcyclotetrasiloxane-2,4,6,8-tetrayl)tetra-3,1-propanediyl]tetrakis(ω-methoxy-, homopolymer (9CI) (CA INDEX NAME)

CM 1  
 CRN 362060-08-0  
 CMF (C<sub>2</sub> H<sub>4</sub> O)<sub>n</sub> (C<sub>2</sub> H<sub>4</sub> O)<sub>n</sub> (C<sub>2</sub> H<sub>4</sub> O)<sub>n</sub> C<sub>20</sub> H<sub>48</sub> O<sub>8</sub> Si<sub>4</sub>  
 CCI PMS

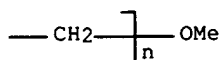
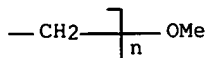
P. 3 of 5



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PAGE 1-B



RN 561065-55-2 HCAPLUS

CN Cyclotetrasiloxane, 2,4,6,8-tetramethyl-2,4,6,8-tetrakis(4,7,10,13-tetraoxatetradec-1-yl)-, polymer with  $\alpha, \alpha', \alpha'', \alpha'''$ -[(2,4,6,8-tetramethylcyclotetrasiloxane-2,4,6,8-tetra-3,1-propanediyl)tetrakis[ $\omega$ -methoxypoly(oxy-1,2-ethanediyl)]]

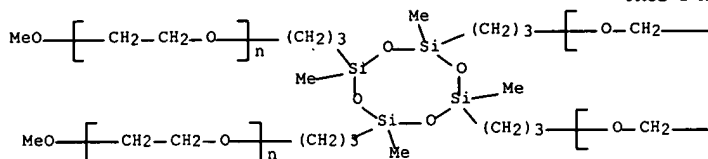
CM 1

CRN 362060-08-0

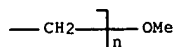
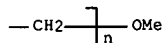
CMF (C2 H4 O)n (C2 H4 O)n (C2 H4 O)n (C2 H4 O)n C20 H48 O8 Si4

CCI PMS

PAGE 1-A



PAGE 1-B

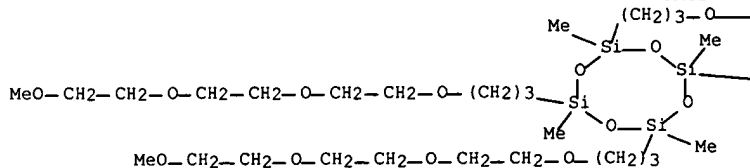


CM 2

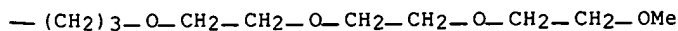
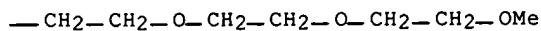
CRN 131718-86-0

CMF C44 H96 O20 Si4

PAGE 1-A



PAGE 1-B

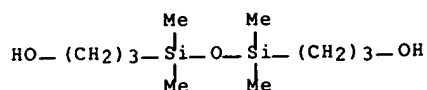


IT 18001-97-3P 104104-82-7P

(production of oxyalkylene-containing acrylate-terminated polysiloxane crosslinking agents)

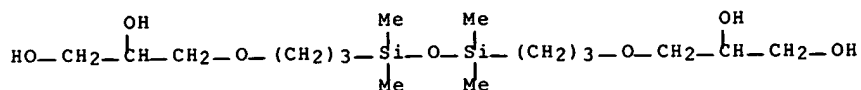
RN 18001-97-3 HCAPLUS

CN 1-Propanol, 3,3'-(1,1,3,3-tetramethyl-1,3-disiloxanediyl)bis-



RN 104104-82-7 HCAPLUS

CN 1,2-Propanediol, 3,3'-[(1,1,3,3-tetramethyl-1,3-disiloxanediyl)bis(3,1-propanediylloxy)]bis- (9CI) (CA INDEX NAME)



IT 2370-88-9, 2,4,6,8-Tetramethylcyclotetrasiloxane 3277-26-7

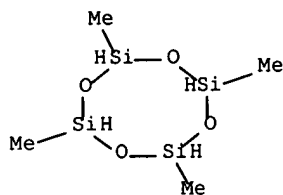
, 1,1,3,3-Tetramethyldisiloxane

RL: RCT (Reactant); RACT (Reactant or reagent)

(production of oxyalkylene-containing acrylate-terminated polysiloxane crosslinking agents)

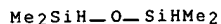
RN 2370-88-9 HCAPLUS

CN Cyclotetrasiloxane, 2,4,6,8-tetramethyl-



RN 3277-26-7 HCAPLUS

CN Disiloxane, 1,1,3,3-tetramethyl- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



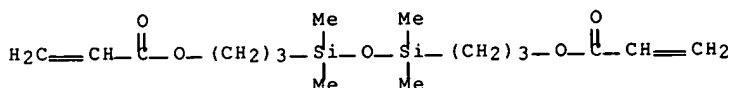
IT 17898-71-4P 561065-49-4P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(terminating agent; production of oxyalkylene-containing acrylate-terminated polysiloxane crosslinking agents)

RN 17898-71-4 HCAPLUS

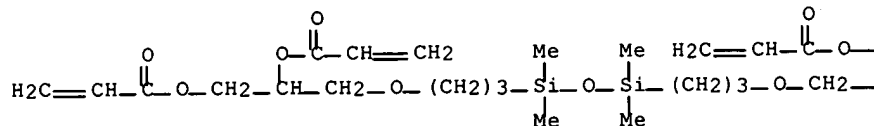
CN 2-Propenoic acid, (1,1,3,3-tetramethyl-1,3-disiloxanediyl)di-3,1-propanediyl ester (9CI) (CA INDEX NAME)



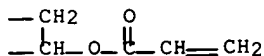
RN 561065-49-4 HCAPLUS

CN 2-Propenoic acid, (1,1,3,3-tetramethyl-1,3-disiloxanediyl)bis(3,1-propanediylloxy-3,1,2-propanetriyl) ester (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



p. 5 of 5

Date ?

10/733,265 searched 12/7/2004

L69 ANSWER 12 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2003:15537 DN 138:74288 ED Entered STN: 08 Jan 2003

TI Polymer electrolytes and polyethylene glycol-containing crosslinked polysiloxanes therefor

IN Iwatani, Keizo; Yoza, Akira; Oikawa, Takao; Yamamoto, Yasuhiro

PA Chisso Corp., Japan

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003002974	A2	20030108	JP 2001-188321	20010621
PRAI JP 2001-188321		20010621		

JP priority-6/21/01  
JP pub - 1/8/03

AB The electrolytes, showing good flexibility and high ion conductivity, comprise Li salts and crosslinked polysiloxanes having trifunctional Si and polyoxyethylene repeating units,. The polysiloxanes may be represented by  $[X(OX_2H_4)q_1OY_1]_nZ_m[(R_2SiO)rSiO_3/2]_p$  [X = C1-6 alkyl; Y1 = C2-20 alkylene; Z = group both-ends-terminated with C2-20 alkylene; R = X1-6 alkyl; q1, n, m  $\geq$  1; r = 0, 1; p = 4-60; n + 2m = p]. Thus, triethylene glycol allyl Me ether 0.803, polyethylene glycol diallyl ether 0.748, and 1,3,5,7,9,11,13,15-octakis(dimethylsiloxy)pentacyclo[9.5.1.13,9.15.15.1.7,13]octasiloxane 1.00 g were reacted at 80-120° in the presence of Pt-divinyltetramethyldisiloxane complex to give a crosslinked product, 0.1 g of which was reacted with 5.98 + 10<sup>-3</sup> g LiClO<sub>4</sub> in THF to give a solid electrolyte showing ion conductivity 1.8 + 10<sup>-5</sup> S/cm and flexural modulus 0.53 MPa at room. temperature

IT Capacitors

(electrolytes for; high-ion-conductivity and flexible solid electrolytes of polyethylene glycol-containing POSS-Li complexes)

IT 7439-93-2DP, Lithium, poly(ethylene oxide)-oligosilsesquioxane complexes, hydrochlorate-containing 481052-04-4DP, reaction products with triethylene glycol allyl Me ether, lithium complexes, hydrochlorate-containing

(high-ion-conductivity and flexible solid electrolytes of polyethylene glycol-containing POSS-Li complexes)

RN 7439-93-2 HCAPLUS

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

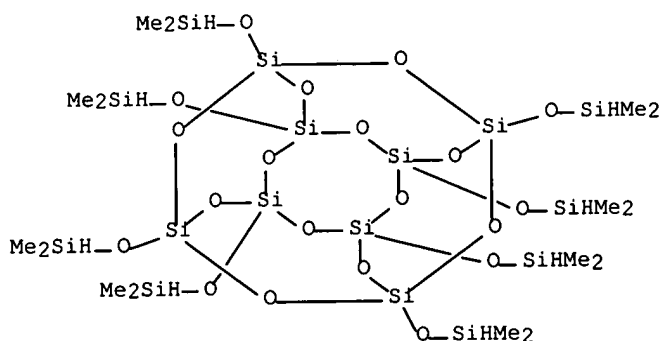
RN 481052-04-4 HCAPLUS

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octakis[(dimethylsilyl)oxy]-, polymer with  $\alpha$ -2-propenyl- $\omega$ -(2-propenyloxy)poly(oxy-1,2-ethanediyl) (9CI) (CA INDEX NAME)

CM 1

CRN 125756-69-6

CMF C16 H56 O20 Si16

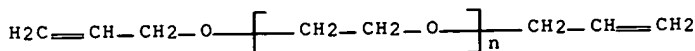


CM 2

CRN 59788-01-1

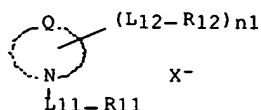
CMF (C2 H4 O)<sub>n</sub> C6 H10 O

CCI PMS



L69 ANSWER 14 OF 36 HCAPLUS COPYRIGHT ACS on STN  
 AN 2002:553509 DN 137:127526 ED Entered STN: 26 Jul 2002  
 TI **Electrolyte composition with high ion conductivity and high ion transport number and nonaqueous electrolyte secondary batteries**  
 IN Wariishi, Koji; Sen, Masakazu; Ono, Michio  
 PA Fuji Photo Film Co., Ltd., Japan

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002208433	A2	20020726	JP 2001-325587	20011023
JP 2000-323202	A	20001023		



*No baking mentioned?*

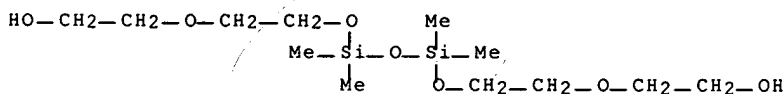
AB The compns. contain (A)  $\geq 1$  compds. selected from I, R21L21A+(L22R22)(L23R23)(L24R24) X- and R31L31N+(L32R32):C[N(L33R33)(L34R3 4)][N(L35R35)(L36R36)] X- (Q = group for forming 5- or 6-membered aromatic cation; L11-12, L21-24, L31-36 = (un)substituted alkylene(oxy) and/or alkenylene(oxy); R11-12, R21-24, R31-36 = H, OM(OR)n, may form ring;  $\geq 1$  of R11-12, R21-24, R31-36 = OM(OR)n; R = (un)substituted alkyl or aryl; M = Si, B, Ti, Al, Ge, Sn; n1 = 0, natural number; X- = anion) and (B) salts of Group IA or IIA ions. Preferable Markush structures for I are further specified. Also claimed are solid electrolyte compns. containing crosslinked compds. of component A, obtained by reaction of A with compds. having  $\geq 2$  nucleophilic groups in a mol., instead of component A. Nonaq. electrolyte secondary batteries with the said electrolyte compns. are also claimed. Batteries with high capacity and excellent cycle characteristics are obtained.

IT 7439-93-2DP, Lithium, polyoxyalkylene-ionene polymer complexes  
 444046-12-2DP, lithium complex  
 (ammonium compound-Li salt mixts. or their crosslinked solids as electrolytes for nonaq. secondary batteries)

RN 444046-12-2 HCAPLUS  
 CN 1H-Imidazolium, 1-methyl-3-[2-[(triethoxysilyl)oxy]ethyl]-, salt with 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]methanesulfonamide (1:1), polymer with 7,7,9,9-tetramethyl-3,6,8,10,13-pentaoxa-7,9-disilapentadecane-1,15-diol (9CI) (CA INDEX NAME)

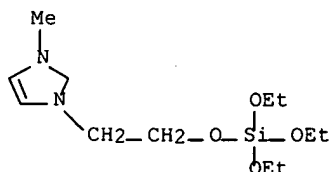
CM 1  
 CRN 61854-15-7  
 CMF C12 H30 O7 Si2

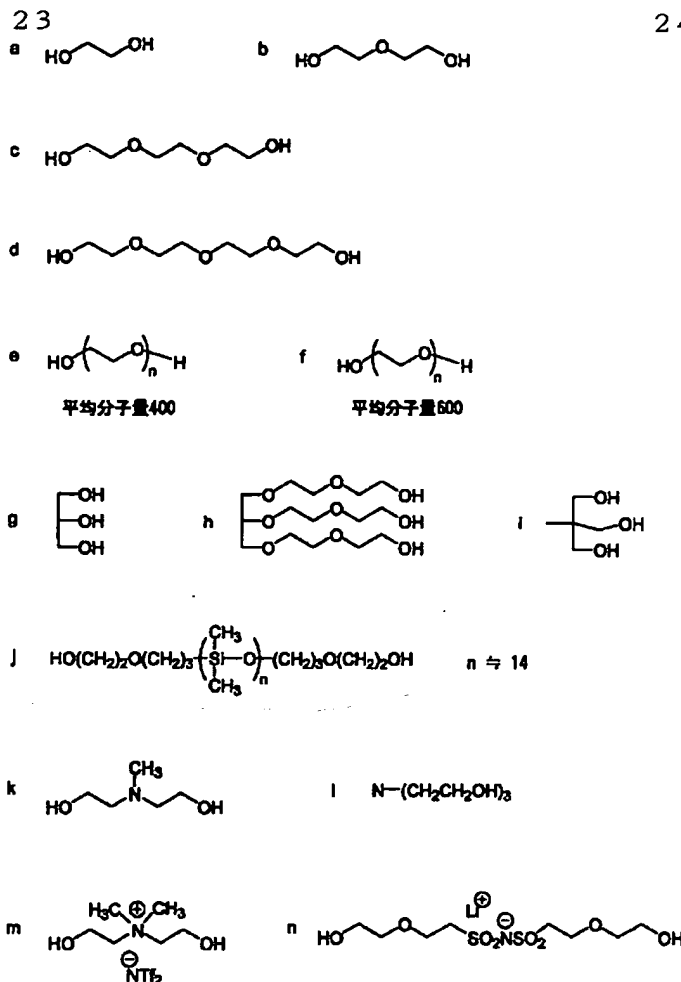
*a or c or d = 1*  
*b = 0*



CM 2  
 CRN 444045-88-9  
 CMF C12 H25 N2 O4 Si . C2 F6 N O4 S2

CM 3  
 CRN 444045-87-8  
 CMF C12 H25 N2 O4 Si





【0056】上記求核剤の添加量は、電解質組成物全体に対して0.1～70%質量%が好ましく、0.3～50質量%がより好ましく、0.5～30質量%が特に好ましい。求核剤を添加した際の反応温度は0～150℃とするのが好ましく、10～100℃とするのがより好ましい。また、求核剤の反応時間は好ましくは5分から2日、より好ましくは10分から1日である。なお、反応温度及び反応時間は特に限定されることはなく、所望の反応速度に応じて適宜選択できる。

【0057】本発明の電解質組成物は、ポリマー添加、オイルゲル化剤添加、多官能モノマー類を含む重合、ポリマーの架橋反応等の手法により、ゲル化（固体化）させて使用することもできる。ポリマー添加によりゲル化させる場合は、Polymer Electrolyte Reviews, 1及び2 (J. R. MacCallumとC. A. Vincentの共編、ELSEVIER APPLIED SCIENCE)に記載の化合物等を使用することができる。特に、ポリアクリロニトリル、ポリフッ化ビニリデン、ポリエチレンオキサイド、ポリシロキサン等が好適に用いられる。オイルゲル化剤添加によりゲル化させる場合は、工業科学雑誌 (J. Chem. Soc. Japan, Ind. Chem. Sec.), 46, 779 (1943)、J. Am. Chem. Soc., 111, 5542 (1989)、J. Chem. Soc., Chem. Commun., 1993, 390、Angew. Chem. Int. Ed. Engl., 35, 1949 (1996)\* 50

\* 6)、Chem. Lett., 1996, 885、J. Chem. Soc., Chem. Commun., 1997, 545等に記載されている化合物を好適に用いることができる。中でも分子構造中にアミド構造を有する化合物がより好ましい。

#### 【0058】〔2〕非水二次電池

次に、本発明の電解質が好ましく用いられる二次電池について説明する。本発明の二次電池は、正極シートと負極シートを隙間を設けて積層し、当該隙間に本発明の電解質組成物を充填したものである。

【0059】正極シートは、集電体上に正極活物質を含む電極合剤を塗布したものであり、負極シートは、集電体上に負極活物質を含む電極合剤を塗布したものである。以下、正極シート及び負極シートの材料について詳細に説明する。

#### 【0060】(A) 集電体

正極シート・負極シートの集電体としては、構成された電池において化学変化を起こさない電子伝導体を用いられる。

【0061】正極シートの集電体としては、アルミニウム、ステンレス鋼、ニッケル、チタンなどの他にアルミニウムやステンレス鋼の表面にカーボン、ニッケル、チタンあるいは銀を処理させたものが好ましく、特に好ましいのはアルミニウム、アルミニウム合金である。

Re: Claim 4

10/733,265 searched 12/7/2004

L69 ANSWER 15 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2001:718125 HCAPLUS Full-text

DN 135:273945

ED Entered STN: 02 Oct 2001

TI Crosslinkable polymer-based electroconductive coatings, waterproof electric conductors, and their manufacture

IN Saito, Takashi; Uzawa, Masashi

PA Mitsubishi Rayon Co., Ltd., Japan

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001270999	A2	20011002	JP 2000-362863	20001129
JP 2000-14099	A	20000119		

OS MARPAT 135:273945

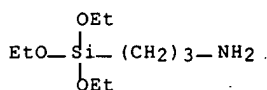
AB The coatings, useful for batteries, capacitors, chemical sensors, etc., comprise (a) water-soluble electroconductive polymers bearing sulfonic acid groups and/or carboxyl groups, (b) solvents, (c) silane coupling agents YXSiR43R44R45 [R43, R44, R45 = H, C1-6 alkyl(oxy), amino, acetyl, Ph, halo; X = (CH2)n or (CH2)nO(CH2)m (n, m = 0-6 integer); Y = OH, thiol, amino, and/or epoxy], and optional (d) colloidal SiO2 with grain size of 1-300 nm. The polymers may have skeleton of (phenylene)vinylene, thienylene, pyrrolylene, (imino)phenylene, isothianaphthene, furylene, and/or carbazolyene (Markush given). The polymers may be prepared by oxidative polymerization of alkoxy-substituted aminobenzenesulfonic acids, their alkali metal salts, and/or their (substituted) ammonium salts in basic solns. The coatings are formed on supports and treated at ordinary temperature-250°. Thus, an aqueous composition of 5:1 (part) 2-aminoaniso-4-sulfonic acid homopolymer/γ-glycidoxypropyltrimethoxysilane was applied on a glass plate and treated at 25° to give a coating showing surface resistivity 5.0 + 105 Ω/.box. and good water resistance.

IT 919-30-2, γ-Aminopropyltriethoxysilane

(coupling agents; sulfonic acid- and/or carboxyl-bearing conducting polymers for waterproof antistatic coatings)

RN 919-30-2 HCAPLUS

CN 1-Propanamine, 3-(triethoxysilyl)- (9CI) (CA INDEX NAME)



a or c or d = 1  
b = 0

OEt = alkoxy group

L69 ANSWER 20 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 1998:406008 DN 129:82389 ED Entered STN: 02 Jul 1998  
 TI Copolyethers and solid polymer electrolytes and secondary batteries  
 IN Watanabe, Masayoshi; Miura, Katsuhito; Yanagida, Masanori; Higobashi,  
 PA Daiso Co., Ltd., Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9825990	A1	19980618	WO 1997-JP4499	19971208
	CA 2244904	AA	19980618	CA 1997-2244904	19971208
	EP 885913	A1	19981223	EP 1997-946152	19971208
	EP 885913	B1	20030416		
	CN 1210548	A	19990310	CN 1997-192119	19971208
	CN 1094494	B	20021120		
	TW 444044	B	20010701	TW 1997-86118417	19971208
	JP 3223978	B2	20011029	JP 1998-526483	19971208
	US 6180287	B1	20010130	US 1998-101971	19980730
PRAI	JP 1996-328422	A	19961209		
	JP 1996-345244	A	19961225		
	WO 1997-JP4499	W	19971208		

No  
heating  
mentioned?

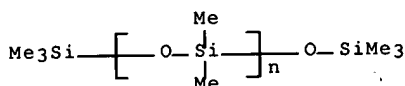
AB Solid polymer electrolytes prepared by blending (1) copolyether comprising a main chain derived from ethylene oxide mols. and a side chain having two oligooxyethylene groups with (2) an electrolytic salt and, if necessary, (3) a plasticizer selected from aprotic organic solvents, derivs. and metal salts of polyalkylene glycols having Mn 200-5000, and metal salts of the derivs. are superior to the solid electrolytes of the prior art in ionic conductivity and excellent in processability, moldability and mech. strengths. Secondary batteries can be produced by combining the solid polymer electrolytes with a neg. electrode of metallic lithium and a pos. electrode of cobalt lithium. 2-Glycidioxy-1,3-bis(2-methoxyethoxy)propane and ethylene oxide were copolymd. and cast together with LiClO<sub>4</sub> to give a film with elec. conductivity 8.7 x 10<sup>-4</sup> S/cm.

IT 7439-93-2D, Lithium, polyoxyalkylene complexes, uses 7791-03-9, Lithium perchlorate (copolyethers and solid polymer electrolytes and secondary batteries)

IT 31900-57-9D, Dimethylsilanediol homopolymer, trimethylsilyl-terminated 42557-10-8, Polyoxydimethylsilylene, trimethylsilyl-terminated 156118-35-3D, Dimethylsilanediol-methylsilanediol copolymer, trimethylsilyl-terminated (copolyethers and solid polymer electrolytes and secondary batteries)

RN 42557-10-8 HCAPLUS

CN Poly[oxy(dimethylsilylene)],  $\alpha$ -(trimethylsilyl)- $\omega$ -[(trimethylsilyl)oxy]- (9CI) (CA INDEX NAME)



RN 156118-35-3 HCAPLUS

CN Silanediol, dimethyl-, polymer with methylsilanediol (9CI) (CA INDEX NAME)

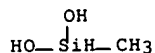
CM 1

CRN 43641-90-3

CMF C H6 O2 Si

looks like a or c or d = 1

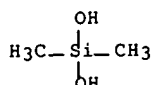
b = 0



CM 2

CRN 1066-42-8

CMF C2 H8 O2 Si



Re: Claim 4

10/733,265 searched 12/7/2004

L133 ANSWER 13 OF 19 WPIX COPYRIGHT THE THOMSON CORP on STN  
AN 1999-573642 [49] DNN N1999-422963 DNC C1999-167488  
TI Polyether copolymer and crosslinked solid polymer electrolyte.  
IN HIGOBASHI, H; MIURA, K; NAKAMURA, S; YANAGIDA, M  
PA (OSAS) DAISO CO LTD

PI EP 945476 A1 19990929 (199949)\* EN 20 C08G065-14  
JP 11269263 A 19991005 (199953) 14 C08G065-24  
US 6159389 A 20001212 (200067) H01G001-74  
JP 3301378 B2 20020715 (200253) 13 C08G065-24  
EP 945476 B1 20040303 (200417) EN C08G065-14  
DE 69915148 E 20040408 (200425) C08G065-14

PRAI JP 1998-75409 19980324

AB EP 945476 A UPAB: 19991124

NOVELTY - A copolymer obtained by combining epichlorohydrin, ethylene oxide, and a crosslinkable oxirane compound gives a solid electrolyte of superior ionic conductivity without plastic deformation or flow at high temperatures.

DETAILED DESCRIPTION - A polyether copolymer having a weight average molecular weight, Mw, of 104 to 107 comprises (mol.%):

(A) a repeating unit of formula (I) (4-40 mol.%);

(B) a repeating unit derived from a monomer of formula (II) (59-95 mol.%); and

(C) a repeating unit derived from a monomer of formula (IIIA or IIIB) (0.001-15 mol.%):

R1 and R2 = substituent containing an ethylenically unsaturated group, a reactive silicon group or a terminal epoxy group of formula (IV):

R3 = a divalent organic residue comprising at least one C, O, or H.

INDEPENDENT CLAIMS are included for:

(1) a crosslinked material obtained by utilizing the reactivity of a crosslinking component of the polyether copolymer, of an ethylenically unsaturated group of the copolymer, the Si group, or the side chain epoxy group;

(2) a crosslinked solid polymer obtained by mixing a crosslinking material crosslinked by utilizing the reactivity of a crosslinking monomer component of the polyether copolymer with an electrolyte salt compound; and

(3) a battery comprising the crosslinked solid polymer electrolyte.

USE - The solid electrolyte is useful for batteries, capacitors, sensors, electrochromic devices, and as an antistatic agent for rubber and plastics.

ADVANTAGE - S - The solid electrolyte has superior processability, moldability, mechanical strength, flexibility, and heat resistance.

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Components: The polyether copolymer has a weight average molecular weight 105 to 5.106, comprising 9-30 mol.% of (A) 90-69 mol.% of (B) and 0.0-10 mol.% of (C). (C) is at least one crosslinking component selected from allyl glycidyl-,

allyl phenyl glycidyl-, or vinyl glycidyl ether, glycidyl (meth)acrylate-, sorbate-, cinnamate-, or crotonate, Component (C) is at least one monomer selected from: 3-glycidylpropyltrimethoxysilane, 3-glycidioxypropylmethyltrimethoxysilane, 4-(1,2-epoxy)butyltrimethoxysilane, 5-(1,2-epoxy)pentyltrimethoxysilane, or 2-(3,4-epoxycyclohexyl)ethyltrimethoxysilane, or 2,3-epoxypropyl-2,3-2-methylpropyl-, ethylene glycol-2,3-epoxypropyl-2,3-epoxy-2-methyl propyl ether, 2-methyl-1,2,3,4-diepoxybutane, 2-methyl-1,2,3,4-diepoxybutane, hydroquinone-2,3-epoxypropyl-2,3-methyl propyl-, and catechol-2,3-epoxypropyl-2,3-epoxy-22-methyl propyl ether. The crosslinking is obtained by utilizing a radical initiator selected from an organic peroxide and an azo compound, or crosslinking by using active energy radiation, i.e. UV or electron radiation, a hydrosilation reaction with a compound having at least two Si hydride groups, crosslinking by using polyamines or acid anhydrides. The crosslinked solid polymer electrolyte is obtained by mixing a crosslinked material obtained by utilizing the reactivity of a reactive Si group, a reactive side chain epoxy group, of the polyether copolymer with an electrolyte salt compound. The electrolyte salt compound is a crosslinked solid polymer electrolyte where the electrolyte salt compound is a compound composed of a cation selected from a metal cation, an ammonium, amidinium, or guanidinium ion, and an anion selected from chloride, bromide, iodide, perchlorate, thiocyanate, tetrafluoroborate, nitrite, AsF<sub>6</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, strearylsulfonate, octylsulfonate, dodecyl benzenesulfonate, naphthalenesulfonate, dodecyl naphthalene, 7,7,8,8-tetracyano-p-quinodimethane, X1SO<sub>3</sub><sup>-</sup>, (X1SO<sub>2</sub>(X2SO<sub>2</sub>)N)<sup>-</sup>, (X1SO<sub>2</sub>(X2SO<sub>2</sub>)(X3SO<sub>2</sub>)C)<sup>-</sup>, and ((X1SO<sub>2</sub>)(X2SO<sub>2</sub>)YC)<sup>-</sup>. X1, X2, and X3 = 1-6 C perfluoroalkyl, Y = nitro, nitroso, carbonyl, carboxyl, or cyano, and X1, X2, X3, and Y = an electron attractive group. The metal cation is selected from Li, Na, Rb, Co, Ni, Cu, Zn, Mn, Fe, Co, Ni, Cu, Zn, and Ag, or from a transition metal. The formulation ratio of the electrolyte salt compound to the polyether copolymer is such that the molar ratio of the number of moles of electrolyte salt compound to the total number of moles of ether oxygen in the polyether copolymer is 0.0001-5.

ABEX EP 945476 A1 UPTX: 19991124

EXAMPLE - After replacing the atmosphere in a 4-neck flask by nitrogen, ethylene oxide (100 g) was added gradually to a mixture of allyl glycidyl ether catalyst (11 g), epichlorohydrin (81 g), and n-hexane (500 g) in the flask, and polymerization was carried out for 20 hours at 20degreesC, and terminated with methanol.

The polymer was isolated by decantation, dried at 40degreesC at normal pressure over 10 hours, to give 185 g of polymer, Tg of -32degreesC, Mw of 1,300,000, heat of fusion 29 J/g. The polymer (1 g) and dicumyl peroxide (0.015 g) as crosslinking agent were dissolved in acetonitrile (5 ml), and the resultant solution was mixed with lithium perchlorate (electrolyte salt compound) so that a molar ratio of electrolyte salt compound to the total number of moles of copolymer ether oxygen was 0.05.

This solution was cast on a polytetrafluoroethylene mold, followed by drying and

further heating under nitrogen at 150 degrees C over 3 hours, to give a film.

The flexibility and conductivity values of the film were not broken and 2.2 x 10<sup>-6</sup> respectively. The corresponding values for a similar film obtained without using a crosslinking agent were broken and 5.7.10<sup>-9</sup>, i.e. the conductivity of the second film was much less than that of the first.

CMC UPB 19991124 M3 \*11\* B414 B712 B713 B720 B741 B742 B743 B744 B760 B796 B798 B799 B832 B833 M210 M211 M212 M213 M214 M215 M216 M220 M221 M222 M223 M224 M225 M226 M231 M232 M233 M250 M272 M281 M282 M283 M320 M411 M510 M520 M530 M540 M620 M781 M782 M904 M905 Q132 Q454 R023

b = 0

a ≥ 1 and also c or d ≥ 1

or

a or c or d ≥ 1

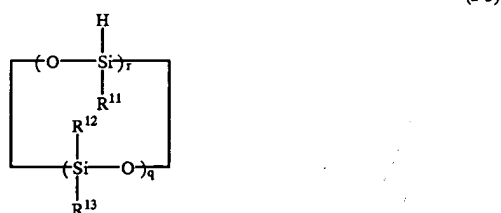
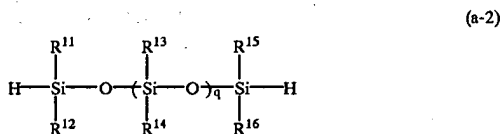
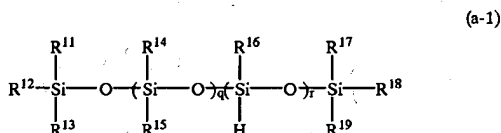


cyclohexanone, 2, 6-bis(4-azidobenzal) 4-methylcyclohexanone, 4, 4'-diazidostilbene-2, 2'-disulfonic acid, 1,3-bis (4'-azidobenzal)-2-propanone-2'-sulfonic acid and 1,3-bis (4'-azidocinnacylidene)-2-propanone.

As a crosslinking aid, there can be optionally used ethylene glycol diacrylate, diethylene glycol diacrylate, triethylene glycol diacrylate, polyethylene glycol diacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, triethylene glycol dimethacrylate, polyethylene glycol dimethacrylate, oligoethylene glycol diacrylate, oligoethylene glycol dimethacrylate, propylene glycol diacrylate, propylene glycol dimethacrylate, oligopropylene glycol diacrylate, oligopropylene glycol dimethacrylate, 1, 3-butylene glycol diacrylate, 1, 4-butylene glycol diacrylate, 1, 3-glycerol dimethacrylate, 1, 1, 1-trimethylolpropane dimethacrylate, 1, 1, 1-trimethylolethane diacrylate, pentaerythritol trimethacrylate, 1, 2, 6-hexanetriacrylate, sorbitol pentamethacrylate, methylenebisacrylamide, methylenebisacrylamide divinyl benzene, vinyl methacrylate, vinyl crotonate, vinyl acrylate, vinyl acetylene, trivinyl benzene, triallyl cyanyl sulfide, divinyl ether, divinyl sulfoxide, diallyl phthalate, glycerol trivinyl ether, allyl methacrylate, allyl acrylate, diallyl maleate, diallyl fumarate, diallyl itaconate, methyl methacrylate, butyl acrylate, ethyl acrylate, 2-ethylhexyl acrylate, lauryl methacrylate, ethylene glycol acrylate, triallyl isocyanurate, maleimide, phenylmaleimide, N,N-m-phenylenebismaleimide, p-quinonedioxime, maleic anhydride and itaconic acid.

As a crosslinking agent having a silicon hydride group, which is used for crosslinking the ethylenically unsaturated group, a compound having at least two silicon hydride groups can be used. Particularly, a polysiloxane compound or a polysilane compound is preferable.

Examples of the polysiloxane compound include a linear polysiloxane compound represented by the formula (a-1) or (a-2), or a cyclic polysiloxane compound represented by the formula (a-3).

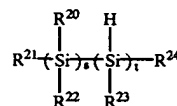


In the formulas (a-1) to (a-3),  $\text{R}^{11}$ ,  $\text{R}^{12}$ ,  $\text{R}^{13}$ ,  $\text{R}^{14}$ ,  $\text{R}^{15}$ ,  $\text{R}^{16}$ ,  $\text{R}^{17}$ ,  $\text{R}^{18}$  and  $\text{R}^{19}$  respectively represent a hydrogen atom or an alkyl or alkoxy group having 1 to 12 carbon atoms; and  $q$  and  $r$  are an integer provided that  $r \geq 2$ ,  $q \geq 0$ ,  $2 \leq q+r \leq 300$ .

As the alkyl group, a lower alkyl group such as a methyl group and an ethyl group is preferable. As the alkoxy group,

a lower alkoxy group such as a methoxy group and an ethoxy group is preferable.

As the polysilane compound, a linear polysilane compound represented by the formula (b-1) can be used.



In the formula (b-1),  $\text{R}^{20}$ ,  $\text{R}^{21}$ ,  $\text{R}^{22}$ ,  $\text{R}^{23}$  and  $\text{R}^{24}$  respectively represent a hydrogen atom or an alkyl or alkoxy group having 1 to 12 carbon atoms; and  $s$  and  $t$  are an integer provided that  $t \geq 2$ ,  $s \geq 0$ ,  $2 \leq s+t \leq 100$ .

Examples of the catalyst of the hydrosilylation reaction include transition metals such as palladium and platinum or a compound or complex thereof. Furthermore, peroxide, amine and phosphine can also be used. The most popular catalyst includes dichlorobis(acetonitrile)palladium(II), chlorotris(triphenylphosphine)rhodium(I) and chloroplatinic acid.

As the crosslinking method of the copolymer wherein the reactive functional group is a reactive silicon group, the crosslinking can be conducted by the reaction between the reactive silicon group and water. In order to increase the reactivity, there may be used, as a catalyst, organometal compounds, for example, tin compounds such as dibutyltin dilaurate, dibutyltin maleate, dibutyltin diacetate, tin octylate and dibutyltin acetylacetonate; titanium compounds such as tetrabutyl titanate and tetrapropyl titanate; aluminum compounds such as aluminum trisacetyl acetate, aluminum trisethyl acetoacetate and diisopropoxyaluminum ethylacetoacetate; or amine compounds such as butylamine, octylamine, laurylamine, dibutylamine, monoethanolamine, diethanolamine, triethanolamine, diethylenetriamine, triethylenetetraamine, cyclohexylamine, benzylamine, diethylaminopropylamine, guanidine and diphenylguanidine.

As the crosslinking method of the copolymer wherein the reactive functional group is an epoxy group, polyamines, acid anhydrides and the like can be used.

Examples of the polyamines include aliphatic polyamines such as diethylenetriamine, dipropylenetriamine, triethylenetetraamine, tetraethylenepentamine, dimethylaminopropylamine, diethylaminopropylamine, dibutylaminopropylamine, hexamethylenediamine, N-aminoethylpiperazine, bis-aminopropylpiperazine, trimethylhexamethylenediamine and dihydrazide isophthalate; and aromatic polyamines such as 4, 4'-diaminodiphenyl ether, diaminodiphenyl sulfone, m-phenylenediamine, 2, 4-toluylenediamine, m-toluylenediamine, o-toluylenediamine and xylylenediamine. The amount of the polyamine varies depending on the type of the polyamine, but is normally within the range from 0.1 to 10% by weight based on the whole composition constituting the solid polymer electrolyte.

Examples of the acid anhydrides includes maleic anhydride, dodecenylsuccinic anhydride, chlondic anhydride, phthalic anhydride, pyromellitic anhydride, hexahydrophthalic anhydride, methylhexahydrophthalic anhydride, tetramethylenemaleic anhydride, tetrahydrophthalic anhydride, methyltetrahydrophthalic anhydride and trimellitic anhydride. The amount of the acid anhydrides varies depending on the type of the acid anhydride, but is normally within the range from 0.1 to 10% by weight based on the whole composition. In the crosslinking, an accelerator can be used. In the crosslinking reaction of polyamines,

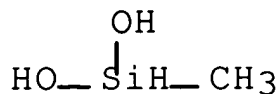
**L69 ANSWER 3 OF 36 HCAPLUS COPYRIGHT ACS on STN**  
**AN 2004:161244 DN 140:202430 ED Entered STN: 27 Feb 2004**  
**TI Salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials**  
**IN Armand, Michel; Michot, Christophe; Gauthier, Michel; Choquette, Yves**  
**PA Hydro-Quebec, Can.; Centre National De La Recherche Scientifique (CNRS)**  
**PATENT NO. KIND DATE APPLICATION NO. DATE**

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6120696	A	20000919	US 1998-125792	19980828
US 6171522	B1	20010109	US 1998-101811	19981119
US 6333425	B1	20011225	US 1998-101810	19981119
US 6228942	B1	20010508	US 1998-125798	19981202
US 6395367	B1	20020528	US 1998-125799	19981202
US 6319428	B1	20011120	US 1998-125797	19981203
US 6365068	B1	20020402	US 2000-609362	20000630
US 6576159	B1	20030610	US 2000-638793	20000809
US 2001024749	A1	20010927	US 2001-826941	20010406
US 6506517	B2	20030114		
US 2002009650	A1	20020124	US 2001-858439	20010516
US 2002102380	A1	20020801	US 2002-107742	20020327
US 2003052310	A1	20030320	US 2002-253035	20020924
US 2003066988	A1	20030410	US 2002-253970	20020924
PRAI CA 1996-2194127	A	19961230		
US 1998-101810	A3	19981119		
US 1998-101811	A3	19981119		
US 1998-125798	A3	19981202		
US 1998-125799	A3	19981202		
US 1998-125797	A1	19981203		
US 2000-638793	A1	20000809		
US 2001-858439	A1	20010516		

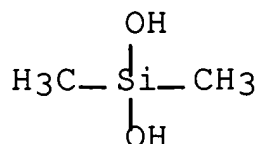
*No  
mention  
of  
baking?*

**AB** This invention describes ionic compds. where the anionic charge is delocalized. One compound of the invention contains an anionic part associated with at least one mono- or multivalent cationic part M<sup>m+</sup>, in a number sufficient to ensure electronic neutrality of the material. M can be a hydronium, nitrosyl NO<sup>+</sup>, an ammonium NH<sub>4</sub><sup>+</sup>, a metallic cation with valence m, an organic cation having a valence m, or an organometallic cation having valence m. The anionic charge is carried by a new pentacyclic moiety or derivative of tetrapentalene carrying electroattractive substituents. The compds. are used notably for ionic conduction, electronic conductors, dyes and colorants, and catalysts for diverse chemical reactions. They can also be used as electrolytes in fuel cells and batteries.

**IT** Polyoxyalkylenes, processes  
 (electrolyte complexes with lithium salts)  
**IT** Secondary batteries  
**IT** Polymer electrolytes  
**IT** Alkali metal salts  
**IT** 7580-67-8, Lithium hydride  
 (salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)  
**IT** 156118-35-3DP, 2-(5-cyano-1,3,4-triazole)-4,4-difluorobutyl-, lithium salt  
 (surfactant and antistatic; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)  
**RN** 156118-35-3 HCAPLUS  
**CN** Silanediol, dimethyl-, polymer with methylsilanediol  
**CM** 1  
**CRN** 43641-90-3  
**CMF** C H6 O2 Si



**CM** 2  
**CRN** 1066-42-8  
**CMF** C2 H8 O2 Si



L69 ANSWER 17 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2000:442060 DN 133:46207 ED Entered STN: 30 Jun 2000  
 TI **Microporous solid electrolytes for lithium secondary batteries**  
 IN Jang, Dong Hun; Kim, Sa Heum; Kim, Han Jun; Hong, Sung Min  
 PA Finecell Co., Ltd., S. Korea

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2000038263	A1	20000629	WO 1999-KR798	19991221
EP 1171927	A1	20020116	EP 1999-960009	19991221
JP 2002543554	T2	20021217	JP 2000-590241	19991221
PRAI KR 1998-57031	A	19981222		
WO 1999-KR798	W	19991221		

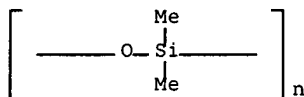
*No  
mention  
of baking?*

AB The present invention relates to a **solid electrolyte** having a good conductivity to lithium ion by allowing the liquid components and **lithium salts** to be absorbed into the **electrolyte** film containing an absorbent added at the time of its preparation and having a porosity, a process for preparing the same and a rechargeable lithium cell using the same as an **electrolyte**. As the absorbent, inorg. materials having not more than 40  $\mu\text{m}$  of particle size can be used. As the polymer binder, any binder whose solubility against the liquid **electrolyte** is small can be used. A wet process can introduce the porous structure of the **electrolyte** film. The **solid electrolyte** according to the present invention has the ionic conductivity of more than approx. 1 to 3  $\times 10^{-3}$  S/cm at room temperature and low reactivity to lithium metal. The cell is fabricated from the **solid electrolyte** together with electrodes by lamination or pressing methods and, the liquid **electrolyte**, which is decomposed by moisture, is introduced to a cell just before packaging. Therefore, the **solid electrolyte** according to the present invention is not affected by the humidity and temperature conditions during the manufacturing of the **electrolyte** film. In addition, the **solid electrolyte** according to the present invention has high thermal, mech. and electrochem. stability, and thus is suitable as an **electrolyte** for rechargeable lithium cells.

IT 9016-00-6, Polydimethylsiloxane  
 (binder; microporous **solid electrolytes** for lithium secondary batteries)

RN 9016-00-6 HCAPLUS

CN Poly[oxy(dimethylsilylene)] (8CI, 9CI) (CA INDEX NAME)



IT 556-65-0, Lithium thiocyanate 7791-03-9, Lithium perchlorate 12162-79-7, Lithium manganese oxide 12190-79-3, Cobalt lithium oxide 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate  
 (microporous **solid electrolytes** for lithium secondary batteries)

L69 ANSWER 18 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 2000:17088 DN 132:152905 ED Entered STN: 09 Jan 2000

TI **Synthesis and characterisation of poly(methylalkoxysiloxane) solid polymer electrolytes incorporating different lithium salts**

AU Morales, E.; Acosta, J. L.

CS Instituto de Ciencia y Tecnologia de Polimeros, CSIC, Madrid, 28006, Spain

SO **Electrochimica Acta (1999), 45(7), 1049-1056**No  
mention  
of  
baking?

CODEN: ELCAAV; ISSN: 0013-4686

PB Elsevier Science Ltd.

LA English

AB Two comb polymers with oligo-oxyethylene side chains of the type  $-O-(CH_2-CH_2-O)_n-CH_3$  were prepared from poly(methylhydrosiloxane) (PMHS). Homogeneous polymer electrolytes were made from the two synthesized polymers and four lithium salts having different chemical structures, such as lithium perchlorate ( $LiClO_4$ ), lithium trifluoromethanesulfonate ( $LiCF_3SO_3$ ), lithium hexafluorophosphate ( $LiPF_6$ ) and lithium bis(trifluoromethane sulfonylimide) ( $LiN(SO_2CF_3)_2$ ) by solvent casting method, and their thermal, elec. and electrochem. properties measured as a function of temperature. Results indicate that polymer electrolyte complexes are amorphous materials, and that its properties depend on the oligo-oxyethylene chain length as well as on the chemical nature of the lithium salt.

RE.CNT 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD

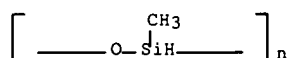
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- (31) Zhou, G; Macromolecules 1993, V26, P2202 HCAPLUS

IT 7791-03-9P, Lithium perchlorate 21324-40-3P, Lithium hexafluorophosphate 33454-82-9P, Lithium trifluoromethanesulfonate

IT 7439-93-2DP, Lithium, complexes with poly(methylalkoxysiloxanes), uses 9004-73-3DP, Methylsilanediol homopolymer, SRU, reaction products with triethylene glycol Me ether, complexes with lithium 49718-23-2DP, Methylsilanediol homopolymer, reaction products with triethylene glycol Me ether, complexes with lithium

RN 9004-73-3 HCAPLUS

CN Poly[oxy(methylsilylene)] (8CI, 9CI) (CA INDEX NAME)



Claim 1 structures

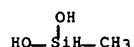
RN 49718-23-2 HCAPLUS

CN Silanediol, methyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 43641-90-3

CMF C H6 O2 Si



L100 ANSWER 3 OF 4 HCAPLUS COPYRIGHT ACS on STN

AN 1995:996372 HCAPLUS Full-text

DN 124:90491

ED Entered STN: 22 Dec 1995

TI High-solids, curable coating compositions

IN Miyazoe, Seigo; Fushimi, Akira; Inoue, Masanobu

PA Nippon Paint Co., Ltd., Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9527010	A1	19951012	WO 1995-JP618	19950331
	AU 9520844	A1	19951023	AU 1995-20844	19950331
	EP 754209	A1	19970122	EP 1995-913392	19950331
	EP 754209	B1	19980902		
	JP 10503534	T2	19980331	JP 1995-525563	19950331
	JP 3280031	B2	20020430		
	CA 2185681	C	20031202	CA 1995-2185681	19950331
	CA 2185681	AA	19951012		
	US 5854350	A	19981229	US 1996-718504	19961108
PRAI	JP 1994-87523	A	19940401		
	WO 1995-JP618	W	19950331		

AB Aminoplast-free title compns. contain 5-80% polymer containing free and esterified carboxyl groups and having an acid value 50-300 mg KOH/g, 1-80% (meth)acrylic polymer containing hydroxyl and epoxy groups and having an epoxy equivalent of 200-1000 and a hydroxyl equivalent of 250-1500, and 1-50% alkoxy and(or) epoxy group-containing silicon polymer. A typical solventborne composition with solids content 49.5% contained 70% 25.7:109:325:240:300 acrylic acid-2-ethylhexyl acrylate-iso-Bu acrylate-maleic anhydride-styrene copolymer solution 36.4, 77% 340:229:231:200 cyclohexyl acrylate-glycidyl methacrylate-4-hydroxybutyl acrylate-Veova 9 copolymer solution 58.6, (SiR1R2O)5(SiR3R4R5O1/2)4(SiR6O3/2)2 (R1 = R3 = R4 = Me, R2 = R4 = MeO/BuO = 1/1, R5 = MeO/ $\gamma$ -glycidyloxypropyl = 1/1) (epoxy equivalent 625, alkoxy equivalent 83) 5, tert-butylammonium glycolate 1, dibutyltin bis(Bu malate) 1, tri-Et orthoformate 2, surface conditioner 1.5, Tinuvin 900 2, and Tinuvin 123 1 part.

RN 172822-34-3 HCAPLUS

CN Neononanoic acid, ethenyl ester, polymer with cyclohexyl 2-methyl-2-propenoate,  $\alpha$ -(dimethoxymethylsilyl)- $\omega$ -[(dimethoxymethylsilyl)oxy]poly[oxy(methoxymethylsilylene)], ethenylbenzene, 2-ethylhexyl 2-methyl-2-propenoate, 2,5-furandione, 4-hydroxybutyl 2-propenoate, 2-methylpropyl 2-methyl-2-propenoate, oxiranylmethyl 2-methyl-2-propenoate and 2-propenoic acid, methyl ester

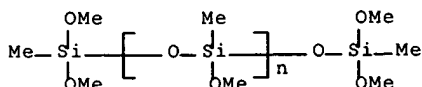
CM 1  
CRN 67-56-1  
CMF C H4 O

No  
metal  
Salt

H<sub>3</sub>C-OH

CM 2  
CRN 174450-49-8  
CMF (C12 H22 O2 . C11 H20 O2 . C10 H16 O2 . C8 H8 . C7 H12 O3 . C7 H12 O2 . C7 H10 O3 . C4 H2 O3 . C3 H4 O2 . (C2 H6 O2 Si)n C6 H18 O5 Si2)x  
CCI PMS

CM 3  
CRN 172682-46-1  
CMF (C2 H6 O2 Si)n C6 H18 O5 Si2  
CCI PMS



→ Claim 4 structure

L100 ANSWER 2 OF 4 HCAPLUS COPYRIGHT ACS on STN  
 AN 1995:997340 DN 124:120302 ED Entered STN: 22 Dec 1995  
 TI Curable resin compositions for top coatings  
 IN Miyazoe, Seigo; Ito, Etsuyuki; Fushimi, Akira; Inoue, Masanobu  
 PA Nippon Paint Co., Ltd., Japan

Same  
Assignee

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9528452	A1	19951026	WO 1995-JP757	19950418
	CA 2186008	AA	19951026	CA 1995-2186008	19950418
	AU 9522250	A1	19951110	AU 1995-22250	19950418
	EP 756614	A1	19970205	EP 1995-915342	19950418
	EP 756614	B1	19981223		
	JP 10503787	T2	19980407	JP 1995-526871	19950418
	JP 3148246	B2	20010319		
	US 5760137	A	19980602	US 1996-727464	19961203
PRAI	JP 1994-104525	A	19940419		
	JP 1994-104526	A	19940419		
	WO 1995-JP757	W	19950418		

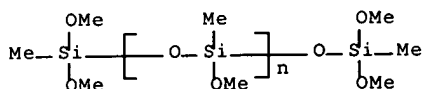
AB High-solids, curable resin compns. having an good storage stability, that provide top coatings with good mar, acid, and water resistance in 2-coat, 1-bake processes contain 5-70% polymer containing free and esterified carboxyl groups and having an acid value of 50-300 mg KOH/g, 1-70% OH- and epoxy group-containing polymer having an epoxy equivalent of 200-1000, OH equivalent of 250 to 1500, 1-45% alkoxy group-containing silicon polymer having an alkoxy equivalent 50-1500 and epoxy equivalent 100-1500, 1-70% polyester having OH value  $\leq$  300 mg KOH/g, acid value 20-400 mg KOH/g, and mol. weight 400-6000, and optionally, 1-40% aminoplast curing agent. A typical 51.1% solids composition contained 25.7:109:325:240:300 acrylic acid-2-ethylhexyl methacrylate-iso-Bu acrylate-maleic anhydride-styrene copolymer Me ester solution 23.4, 77% 340:229:231:200 cyclohexyl methacrylate-glycidyl methacrylate-4-hydroxybutyl acrylate-Veova 9 copolymer solution 46.6, (SiMeR1O)5(SiMeR2R3O1/2)4(SiMeO3/2)2 (R1 and R2 = MeO/BuO = 1/1, R3 = MeO/ $\gamma$ -glycidyloxypropyl = 1/1) 10, 75% 183:110:290:285:221 azelaic acid-Cardura E-neopentyl glycol-isophthalic acid-trimethylolpropane copolymer solution 20, Bu4NBr 1, butyltin trioctoate 1, tri-Et orthoformate 1,5, flow-control agent 0.2, UV absorber 2, and light stabilizer 1 part.

IT 172682-46-1, KC 89S

(high-solids curable resin compns. with good storage stability for abrasion- and acid- and water-resistant top layers in 2-coat 1-bake systems)

RN 172682-46-1 HCAPLUS

CN Poly[oxy(methoxymethylsilylene)],  $\alpha$ -(dimethoxymethylsilyl)- $\omega$ -[(dimethoxymethylsilyl)oxy]- (9CI) (CA INDEX NAME)



=

Claim 4 structure

No  
metal  
salt

No mention  
here of  
use as  
solid electrolyte

L133 ANSWER 15 OF 19 WPIX COPYRIGHT THE THOMSON CORP on STN

AN 1998-216483 [19] WPIX Full-text

CR 1999-179924 [15]

DNN N1998-171175 DNC C1998-068592

TI Electrophotographic charge generating element - comprises electroconductive layer, photoconductor charge generating layer and layer of glassy solid electrolyte.

IN COWDERY-CORVAN, J R; FERRAR, W T; MISKINIS, E T; NEWELL, C; RIMAI, D S; SINICROPI, J A; SORRIERO, L J; WEISS, D S; ZUMBULYADIS, N

PA (EAST) EASTMAN KODAK CO

PI US 5731117 A 19980324 (199819)\* 18 G03G005-147

PRAI US 1995-7252P 19951106; US 1996-667270 19960620

AB US 5731117 A UPAB: 19990416

An electrophotographic charge generating element comprises: (a) an electroconductive layer; (b) a photoconductor charge generating layer overlying the electroconductive layer; and (c) a layer of glassy solid electrolyte overlying the electroconductive layer, the glassy solid electrolyte comprising: a silsesquioxane-salt complex having a surface resistivity of 1 multiply 1010 to 1 multiply 1016 ohms/square, the complex having a T2- silicone:T3-silicon ratio of less than 1:1, the complex having a ratio of carbon atoms to silicon atoms of greater than 1.1 to 1.

Also claimed is a developed electrophotographic element comprising the electrophotographic charge generation element as above and a deposited image of positively charging electrophotographic toner.

USE - Charge transporting elements and solid electrolytes are provided.

ADVANTAGE - The elements provide good resistance to abrasion and useful charge transport properties.

CMC UPB 19990416

M3 \*02\* B414 B514 B614 B713 B720 B731 B732 B742 B743  
 B744 B751 B752 B760 B770 B793 B798 B799  
 B832 C017 C035 C053 F012 F019 F100 F199 G010 G011 G012  
 G013 G019 G020 G021 G029 G040 G100 G111 G221 G299 H1 H100 H101  
 H141 H142 H181 H402 H404 H405 H482 H484 H5 H541 H542 H581 H8  
 J471 J472 L660 L699 M210 M211 M212 M213 M214 M215 M216 M231 M232  
 M233 M262 M272 M273 M280 M281 M282 M283 M311 M312 M313 M314 M315  
 M316 M321 M322 M323 M331 M332 M333 M334 M340 M342 M343 M344 M349  
 M351 M361 M373 M381 M383 M391 M392 M393 M411 M510 M520  
 M521 M522 M523 M530 M531 M532 M540 M620 M781 M903 M904  
 Q348 Q349 R043  
 RIN: 00012  
 DCN: 9819-E1602-U

Lithium Salt  
 with  
 [at least] a claim 1 structure  
 + heated.  
 See, e.g., Example 1, Column 21

$$V(x,t) = V_0 - \frac{1}{2} \Delta V_0 \left[ \operatorname{erf} \left( \frac{a+x}{\sqrt{\frac{4t}{R_{ac}C}}} \right) + \operatorname{erf} \left( \frac{a-x}{\sqrt{\frac{4t}{R_{ac}C}}} \right) \right] \quad (1)$$

## EXAMPLE 1

Synthesis of methyl acrylate/methylmethacrylate/methacrylic acid (MaMmE) 70/25/5 wt % latex primer

To a 2 liter three-neck round bottom flask fitted with a mechanical stirrer, condenser and a nitrogen inlet was added 400 mL of deionized water, 20 mL of a 10 % wt/vol solution of sodium dodecylsulfate, 1.0 gram of sodium persulfate and 0.5 grams of sodium bisulfite while the reaction flask was stirred in a 72° C. water bath. An addition funnel containing 70 grams of methyl acrylate, 25 grams of methyl methacrylate and 5 grams of methacrylic acid was placed on the stirred flask and the monomers were added over a 2 hour period. The aqueous phase and the organic phase were purged previous to the monomer addition with nitrogen. The reaction mixture was initially a pale blue color and then became a translucent whitish-blue color. The reaction was allowed to stir overnight, the addition funnel was removed to vent unreacted monomers under a positive nitrogen flow for 50 minutes, and the reaction flask was removed from the water bath and cooled with tap water. The reaction mixture was purified by dialysis against water for 3 days. The polymer had a  $T_g$  of 35° C. (midpoint), a number average molecular weight of 22,600, and a weight average molecular weight 177,000. The resulting solution was then diluted to 2 wt % solids and 0.1 wt % of Triton-100™ surfactant (added as a 10 % wt/vol water solution) was added as a coating aid to provide a "priming solution".

Preparation of 80 wt % propylsilane /20 wt. % glycidoxysilane sol-gel

A sol-gel formulation was prepared as follows. Glacial acetic acid (108.0 grams, 1.80 mol) was added dropwise to a previously prepared, stirred mixture of propyltrimethoxysilane (489.6 grams, 2.97 mol) and 3-glycidoxypropyltrimethoxysilane (122.4 grams, 0.518 mol), followed by the dropwise addition of 3-aminopropyltrimethoxysilane (49.6 grams, 0.277 mol). The acidified silanes were then hydrolyzed by the dropwise addition of excess water (312.0 grams, 17.3 mol). The following day, the clear solution was diluted to approximately 20 wt % solids by the dropwise addition of ethanol (1046 grams) and allowed to stir in a covered vessel for 1 week. DC-190 (16 grams) was subsequently added as a plasticizer, followed by the addition of lithium iodide (9.43 grams, 0.0704 mol) to provide a "sol-gel solution".

Preparation of electrophotographic element

The above described priming solution was coated onto the upper surface of the image loop (electrophotographic element) of a Kodak 1575 Copier-Duplicator marketed by Eastman Kodak Company of Rochester, N.Y. The image loop had a support of poly(ethylene terephthalate). Overlaying the support was an nickel layer, a charge transport layer, and a charge generation layer.

The image loop was overcoated in the form of a continuous web; that is, prior to being cut to size and spliced into a loop. The priming solution was coated onto the charge generation layer (CGL) using a web coating machine operated at a web speed of 20 ft/min and dryer temperature of 80° F. The resulting coated web, having a primer layer about 0.1-0.5 micrometers thick, was wound on a spool. This web was then coated with the above sol-gel solution at a web speed of 10 ft/min and heating to 200° F., with ramped

heating and cooling, and wound on a spool. The web was subsequently cured face down at 180° F. for 24 hours. The cured film was evaluated as follows. Results are presented in Tables 6-8. One piece of overcoated film was evaluated in a Kodak 1575 copier.

Brittleness evaluation

Brittleness was tested by testing samples of the electrophotographic element in accordance with American National Standards Institute Test Standard PH 1.31 Brittleness of Photographic Film, Method B, "WEDGE BRITTLNESS TEST". The following is a description of the procedure.

All samples were tested at about 70° C. and 15 percent relative humidity. The sample size was 15 mm x305 mm. The wedge angle was 9°. The wedge Length was 6 inches. The large wedge opening was 1 inch. The small wedge opening was 0.06 inch.

Samples were cut using a 15 mm Thwing-Albert parallel blade cutter. The samples were allowed to condition for at least 24 hours in the specified environment. The wedge was equipped with a clamp mechanism to hold one end of the loop stationary as the other end is pulled (snapped) through the wedge. The samples were placed in the wedge with the side of interest toward the outside when forming a loop. A reference mark was put on the sample at the wedge opening. This mark was considered the "zero" point for the data collection. The sample was then pulled through the wedge as fast as physically possible using a snap motion with the arm. This process was repeated for a total of 6 samples for each example.

Inspection of the samples required piped transmitted light and or surface reflected light to verify the crack location. The two techniques allow for quick observation with the transmitted light but the reflected light is used to verify samples in question. This results because the image belt has two coatings that respond to the test. Both layer's brittle behavior is observed with transmitted light while only the top surface characteristics can be observed in the reflected mode, allowing separation of the two layers when necessary.

The samples were read using the reference mark placed on the sample previous to testing and locating the crack farthest from that reference mark. The farthest crack is the first crack to occur and represents the largest diameter in the loop at failure. The scale accompanying the wedge provides the diameter of the loop at first failure and has units of inches. The larger the number, the more brittle is the specimen. Six specimens were tested and results were averaged and the standard deviation was determined. Results state the diameter of the loop, in inches, at which the first crack was observed.

Solid State Silicon-29 Nuclear Magnetic Resonance.

The extent of cure of the overcoat was measured by determining the silicon-29 solid state NMR spectra. Resonances were observed in the cross-polarized spectra at -60 PPM, corresponding to  $T^2$  silicon atoms, and at -70 PPM, corresponding to  $T^3$  silicon atoms. Results are presented as the ratio of  $T^2$ -silicon atoms to  $T^3$  silicon atoms (designated  $T^2/T^3$ ).

Electrical properties under low intensity continuous excitation

One measure of an overcoat's ability to carry charge is to compare film voltage vs. exposure sensitometry using continuous exposure to low intensity light (also referred to as "low intensity continuous exposure" or "LICE"). The overcoated electrophotographic element was evaluated by measuring the exposure necessary at 2 ergs/cm<sup>2</sup>sec and a wavelength of 680 nm (approximately the maximum spectral sensitivity of the charge generation layer) to discharge the



TABLE 12

Ex.	V <sub>zero</sub> (50% RH)	V <sub>active</sub> (50% RH)	$\Delta V_{active}$ (50% RH)	V <sub>zero</sub> (30% RH)	V <sub>active</sub> (30% RH)	$\Delta V_{active}$ (30% RH)
Ex. 27	625	295	145	560	450	225
Ex. 28	540	170	120	—	—	—
Ex. 29	—	—	—	—	—	—
Ex. 30	545	200	140	—	—	—
Ex. 31	535	145	95	—	—	—

TABLE 13

Ex.	Speed (100 V) (erg/cm <sup>2</sup> )	V <sub>on</sub> (LCB)	Overcoat thickness (microns)
Ex. 27	9.15	33 Volts	5
Ex. 28	—	—	5
Ex. 29	—	—	5
Ex. 30	—	—	5
Ex. 31	—	—	5

TABLE 14

Ex. or C. Ex.	pt/me/gly (parts by weight)	Tribovoltage after development $\pm 15$ volts
C. Ex. 5	100/0/0	+120
C. Ex. 6	0/100/0	+30
C. Ex. 7	—	-50
C. Ex. 8	—	-80
Ex. 33	75/0/25	+130
Ex. 34	0/50/50	+90
Ex. 35	0/50/50	+45

While specific embodiments of the invention have been shown and described herein for purposes of illustration, the protection afforded by any patent which may issue upon this application is not strictly limited to a disclosed embodiment; but rather extends to all modifications and arrangements which fall fairly within the scope of the claims which are appended hereto:

What is claimed is:

1. An electrophotographic charge generating element comprising:

- (a) an electrically conductive layer;
- (b) a photo conductor charge generating layer overlying said electrically conductive layer; and
- (c) a layer of glassy solid electrolyte overlying said electrically conductive layer, said glassy solid electrolyte comprising: a silsesquioxane-salt complex having a surface resistivity from about  $1 \times 10^{10}$  to about  $1 \times 10^{16}$  ohms/sq, said complex having a T<sup>2</sup>-silicon:T<sup>3</sup>-silicon ratio of less than 1:1, said complex having a ratio of carbon atoms to silicon atoms of greater than 1.1 to 1.

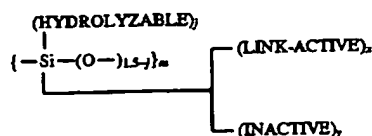
2. The electrophotographic charge generating element of claim 1 wherein said complex has a ratio of carbon atoms to silicon atoms of greater than about 2:1.

3. The electrophotographic charge generating element of claim 2 wherein said complex has a T<sup>2</sup>-silicon:T<sup>3</sup>-silicon ratio of from about 0.5:1 to about 0.3:1.

4. The electrophotographic charge generating element of claim 1 wherein said complex has a T<sup>2</sup>-silicon/T<sup>3</sup>-silicon ratio of less than 0.1:1.

5. The electrophotographic charge generating element of claim 1 wherein said complex has a ratio of carbon atoms to silicon atoms of greater than 1.2 to 1.

6. The electrophotographic charge generating element of claim 1 wherein said silsesquioxane consists essentially of a compound represented by the general formula:



wherein

$0 \leq j < 0.5$ ;

m is greater than 10;

x+y is about 1;

x/(x+y) is less than about 0.40;

HYDROLYZABLE is selected from the group consisting of: OH; H; I; Br; Cl; alkoxy having from 1 to about 6 carbons; —O—Ar, wherein Ar is phenyl or aminophenyl; —(O-ALKYLENE)<sub>n</sub>—O-ALKYL; wherein ALKYLENE is an alkylene group having from 2 to about 6 carbons, n is an integer from 1 to about 3, and ALKYL is an alkyl group having from 1 to about 6 carbons; primary and secondary amino having from one to about 6 carbon atoms; —N-(ALKYL)<sub>2</sub>.

wherein each ALKYL is alkyl having from 1 to about 6 carbons; —NH-(ALKYL).

wherein ALKYL is alkyl having from 1 to about 6 carbons; and —O—CO-ALKYL.

wherein ALKYL is an alkyl having from 1 to 6 carbons; LINK is divalent and is selected from the group consisting of: alkyl having from 1 to about 12 carbons, fluoroalkyl having from 1 to about 12 carbons, cycloalkyl having a single, 5 or 6 membered ring, and aryl having a single, 5 or 6 membered ring;

ACTIVE is monovalent organic moiety having an O, S, or N complexed with a charge carrier, and having a total of carbons and heteroatoms of from about 4 to about 14;

INACTIVE is monovalent and is selected from the group consisting of: alkyl having from 2 to about 12 carbons, fluoroalkyl having from 2 to about 12 carbons, cycloalkyl having a single, 5 or 6 membered ring, and aryl having a single, 5 or 6 membered ring.

7. The electrophotographic charge generating element of claim 6 wherein substantially all HYDROLYZABLE moieties are OH.

8. The electrophotographic charge generating element of claim 6 wherein ACTIVE includes an oxy, thio, ester, keto, imino, or amino group.

9. The electrophotographic charge generating element of claim 6 wherein ACTIVE is selected from the group consisting of: glycidoxy ethers; epoxides; pyrrolidinones; amino alcohols; amines; ammonium salts, carboxylic acids; conjugate salts of carboxylic acids; sulfonic acids; conjugate salts of sulfonic acids; and neutral rings and chains of ethylene oxides, propylene oxides, tetramethylene oxides, ethylene imines, and alkylene sulfides; and the total number of carbons in —LINK-ACTIVE is from 4 to about 25 and combinations thereof.

10. The electrophotographic charge generating element of claim 6 wherein said charge carrier is a low lattice energy salt or a neutral species capable of forming an ionic or substantially ionic charge transfer complex with said silsesquioxane.

11. The electrophotographic charge generating element of claim 6 wherein said charge carrier is selected from the

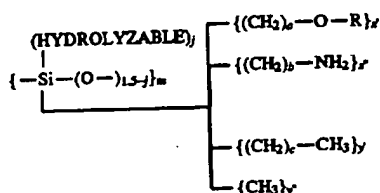
31

group consisting of  $I_2$ ,  $LiCl$ ,  $LiCOOCH_3$ ,  $LiNO_3$ ,  $LiNO_2$ ,  $LiBr$ ,  $LiN_3$ ,  $LiBH_4$ ,  $LiI$ ,  $LiSCN$ ,  $LiClO_4$ ,  $LiCF_3SO_3$ ,  $LiBF_4$ ,  $LiBPh_4$ ,  $NaBr$ ,  $NaN_3$ ,  $NaBH_4$ ,  $NaI$ ,  $NaSCN$ ,  $NaClO_4$ ,  $NaCF_3SO_3$ ,  $NaBF_4$ ,  $NaBPh_4$ ,  $KSCN$ ,  $KClO_4$ ,  $KCF_3SO_3$ ,  $KBF_4$ ,  $KBPh_4$ ,  $RbSCN$ ,  $RbClO_4$ ,  $RbCF_3SO_3$ ,  $RbBF_4$ ,  $RbBPh_4$ ,  $CsSCN$ ,  $CsClO_4$ ,  $CsCF_3SO_3$ ,  $CsBF_4$ ,  $CsBPh_4$ , quaternary ammonium salts, ammonium hydroxide, and ammonium halides; and combinations thereof.

12. The electrophotographic charge generating element of claim 6 further comprising colloidal basic hydrophilic silica covalently bonded to said silsesquioxane.

13. The electrophotographic charge generating element of claim 6 further characterized as a flexible electrophotographic element.

14. The electrophotographic element of claim 13 wherein said silsesquioxane has the general formula:

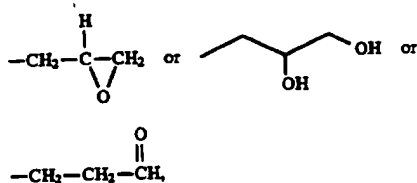


wherein

$$0 \leq j < 0.5;$$

m is greater than 10;

HYDROLYZABLE is selected from the group consisting of: OH; H; I; Br; Cl; alkoxy having from 1 to about 6 carbons;  $-O-Ar$ , wherein Ar is phenyl or aminophenyl;  $-(O-ALKYLENE)_n-O-ALKYL$ ; wherein ALKYLENE is an alkylene group having from 2 to about 6 carbons, n is an integer from 1 to about 3, and ALKYL is an alkyl group having from 1 to about 6 carbons; primary and secondary amino having from one to about 6 carbon atoms;  $-N-(ALKYL)_2$ , wherein each ALKYL is alkyl having from 1 to about 6 carbons; and  $-NH-(ALKYL)$ , wherein ALKYL is alkyl having from 1 to about 6 carbons; and  $-O-CO-ALKYL$ , wherein ALKYL is an alkyl having from 1 to 6 carbons;



a is from 1 to about 5.

b is from 1 to about 5.

c is from 1 to about 6.

x' is from about 5 to about 45 mol %.

x" is from about 1 to about 45 mol %.

x'+x" is from about 5 to 45.

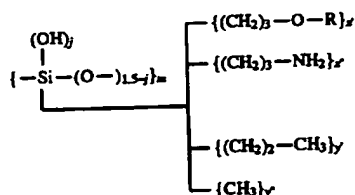
y' is from about 0 to about 95 mol %.

y" is from about 0 to about 95 mol %.

and y'+y" is from about 95 to about 55 mol %.

15. The electrophotographic element of claim 13 wherein said silsesquioxane has the general formula:

32

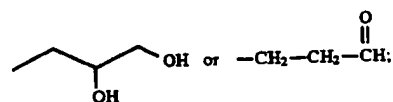
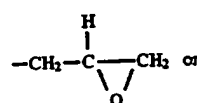


wherein

$$0 \leq j < 0.5;$$

m is greater than 10;

R is



x' is from about 5 to about 30 mol %;

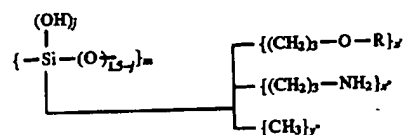
x" is from about 2 to about 10 mol %;

y' is from about 40 to about 90 mol %; and

y" is from about 0 to about 55 mol %.

16. The electrophotographic element of claim 15 wherein  $0.3 \leq j < 0.5$ .

17. The electrophotographic element of claim 13 wherein said silsesquioxane has the general formula:

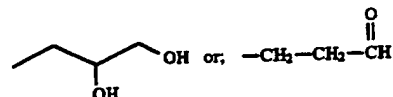
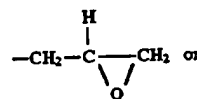


wherein

$$0 \leq j < 0.5;$$

m is greater than 10;

R is



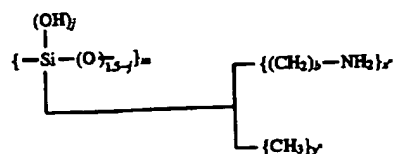
x' is from about 5 to about 30 mol %;

x" is from about 2 to about 10 mol %; and

y" is from about 60 to about 90 mol %.

18. The electrophotographic element of claim 16 wherein  $0.2 \leq j < 0.5$ .

19. The electrophotographic element of claim 13 wherein said silsesquioxane has the general formula:



wherein

$$0 \leq j < 0.3;$$

m is greater than 10;

x" is from about 10 to about 40 mol %; and

y" is from about 0 to about 90 mol %.

20. The electrophotographic element of claim 19 wherein  $0.1 \leq j < 0.3$ .

21. The electrophotographic element of claim 13 wherein said solid electrolyte further comprises a plasticizer.

22. The electrophotographic element of claim 21 wherein said plasticizer is a polysiloxane polyether copolymer.

23. The electrophotographic element of claim 13 wherein said solid electrolyte further comprises an alcohol soluble surfactant.

24. The electrophotographic element of claim 13 wherein said solid electrolyte further comprises poly (dimethylsiloxane).

25. The electrophotographic element of claim 13 further comprising primer bonded between said charge generating layer and said layer of glassy solid electrolyte, said primer being selected from the group consisting of acrylics, polyurethanes, pyrrolidones, polyamides, polyesters, and inorganic alkoxides and combinations thereof.

26. The electrophotographic element of claim 25 wherein said primer is selected from the group consisting of the polymerization product of methacrylate-methylmethacrylate-methacrylic acid latex; copolymer of poly((95 parts by weight) vinylpyrrolidone-(5 parts by weight) methacrylic acid); iodine- or iodide-doped copolymer of poly((95 parts by weight) vinylpyrrolidone-(5 parts by weight) methacrylic acid); and partially hydrolyzed aminopropyltrimethoxysilane.

27. A developed electrophotographic element comprising the electrophotographic charge generation element of claim 1 and a deposited image of positively charging electrophotographic toner.

\* \* \* \* \*

7/9/1

DIALOG(R)File 94:JICST-EPlus

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03601613 JICST ACCESSION NUMBER: 98A0702616 FILE SEGMENT: JICST-E

**Syntheses and Properties of Fluoroalkylated Oligomers Containing Oligo(oxyethylene) Units.**

SAWADA H (1); ITOH M (1); LEE K (1); KYOMANE J (1); KAWASE T (2); HAYAKAWA

Y (3); YOSHINO K (4); BABA M (5)

(1) Nara National Coll. Technol., Nara-ken; (2) Osaka City University, Osaka-shi

; (3) National Ind. Res. Inst. Nagoya, Nagoya-shi; (4)Osaka University, Osaka

; (5) Kagoshima University, Kagoshima-shi

**Nippon Yuka Gakkaishi (Journal of Japan Oil Chemists' Society), 1998,**

VOL.47,NO.7, PAGE.685-694, FIG.3, TBL.3, REF.14

JOURNAL NUMBER: G0238ABW ISSN NO: 1341-8327 CODEN: NIYUF

UNIVERSAL DECIMAL CLASSIFICATION: 661.185.6

LANGUAGE: English COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

ARTICLE TYPE: Original paper

MEDIA TYPE: Printed Publication

**ABSTRACT:** New fluoroalkylated end-capped co-oligomers containing oligo(oxyethylene) units were prepared by reactions of fluoroalkanoyl **peroxides** with oligo(oxyethylene) units -containing vinylsilane(or methacrylates) and co-monomers such as acrylic acid, dimethylacrylamide and isopropylacrylamide. By these fluorinated co-oligomers containing oligo(oxyethylene) units, the surface tension of water could be reduced effectively with a clear break point resembling CMC and appeared to be formed intra- or inter molecular aggregates resembling micelles in water. The co-oligomers containing oligo(oxyethylene) units were found useful for extracting various metal cations and oligomer **electrolyte** film containing LiCF<sub>3</sub>SO<sub>3</sub> showed high ionic conductivity of 4\*10<sup>-5</sup>S/cm at room temperature. Of particular interest is the finding that the fluoroalkylated end-capped acrylic acid co-oligomers containing oligo(oxyethylene) units were found to strongly and selectively inhibit HIV-1 replication in vitro. (author abst.)

**DESCRIPTORS:** polyether; fluorine-containing polymer; oligomer; copolymer;  
**silanes**; vinyl compound; ether; trimer; polymeric surfactant;  
polyelectrolyte; ionic conduction; antiviral action; HIV(virus); HIV1;  
aliphatic carboxylic acid; unsaturated carboxylic acid; carboxamide;  
aliphatic alcohol

**BROADER DESCRIPTORS:** polymer; halogen-containing polymer; silicon compound;  
carbon group element compound; olefin compound; multimer; surfactant;  
polymeric agent; functional polymer; macromolecule; **electrolyte**;  
matter; electric conduction; electrical property; antimicrobial action;  
pharmacological action; action and effect; Lentivirus; Retroviridae;  
RNA virus; virus; microorganism; animal virus; carboxylic acid; alcohol  
; hydroxy compound

## L64 ANSWER 8 OF 18 HCAPLUS COPYRIGHT ACS on STN

AN 1995:268 DN 122:13730 ED Entered STN: 08 Nov 1994  
 TI Hardenable **solid electrolyte** compositions and solid polymer **electrolytes**  
 IN Yokoyama, Masao; Noda, Koji  
 PA Kanegafuchi Chemical Ind, Japan

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 05098169	A2	19930420	JP 1991-259473	19911007
JP 3071262	B2	20000731		
JP 1991-259473		19911007		

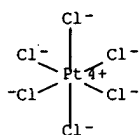
AB The compns. comprise a compound containing  $\geq 1$  alkenyl group(s), a compound containing  $\geq 2$  hydrosilyl groups, a catalyst for hydrosilylation, and an alkali **metal salt**. Polymer **electrolyte** sheets prepared from these compns. are chemical stable, have high flexibility, and are useful for batteries and **capacitors**, etc.

IT Siloxanes and **Silicones**, uses (solid **electrolytes** containing lithium salts and, manufacture of, for batteries and **capacitors**)

IT 16941-12-1  
 (catalyst, in preparation of solid siloxane **electrolytes** for batteries and **capacitors**)

RN 16941-12-1 HCAPLUS

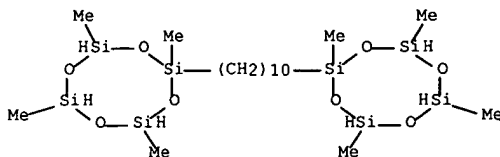
CN Platinate(2-), hexachloro-, dihydrogen, (OC-6-11)- (9CI) (CA INDEX NAME)



● 2 H<sup>+</sup>

RN 147051-70-5 HCAPLUS

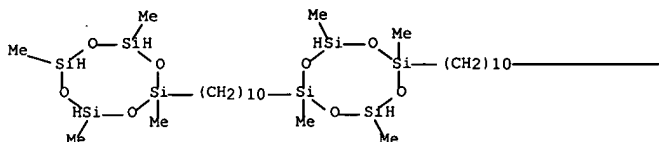
CN Cyclotetrasiloxane, 2,2'-(1,10-decanediyl)bis[2,4,6,8-tetramethyl- (9CI)



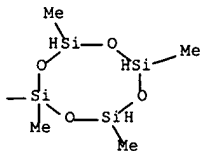
RN 151597-84-1 HCAPLUS

CN Cyclotetrasiloxane, 2,4,6,8-tetramethyl-2,6-bis[10-(2,4,6,8-tetramethylcyclotetrasiloxan-2-yl)decyl]- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B

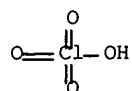


IT 7791-03-9P 33454-82-9P

(solid **electrolytes** containing siloxanes and, manufacture of, for batteries and **capacitors**)

RN 7791-03-9 HCAPLUS

CN Perchloric acid, **lithium salt** (8CI, 9CI) (CA INDEX NAME)



● Li

RN 33454-82-9 HCAPLUS

CN Methanesulfonic acid, trifluoro-, **lithium salt** (8CI, 9CI) (CA INDEX NAME)

*no mention  
of  
baking?*

L69 ANSWER 25 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 1993:639338 HCAPLUS Full-text

DN 119:239338

ED Entered STN: 27 Nov 1993

TI Crosslinked polyethylene glycol and its derivatives as fast ion conductors

IN Lisisimide, John; Du, Xia

PA Chengdu University of Science and Technology, Peop. Rep. China

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 1063112	A	19920729	CN 1991-107117	19910112
CN 1991-107117		19910112		

PI CN 1063112 A 19920729 CN 1991-107117 19910112

PRAI CN 1991-107117 19910112

AB Crosslinked polyethylene glycol and its derivs. are fast ion conductors and are prepared by heating a composition comprising polyethylene glycol or its derivative (mol. weight 200-10,000) 50-95, a crosslinking agent (i.e., an isocyanate or an epoxide) 1-50, an auxiliary crosslinking agent (i.e., a glycidic ether or cyanuric acid) 0-30, an alkaline metal salt (i.e., LiClO<sub>4</sub>, LiCF<sub>3</sub>SO<sub>3</sub>, or KCF<sub>3</sub>SO<sub>3</sub>) 5-60, a additive (i.e., propylene carbonate or DMF) 10-150, and a Pt catalyst 0-10 parts at 65-85° for 24 h in a N atmospheric. The fast ion conductors can be made into thin films (100μ) for use in high-energy-d. rechargeable batteries.

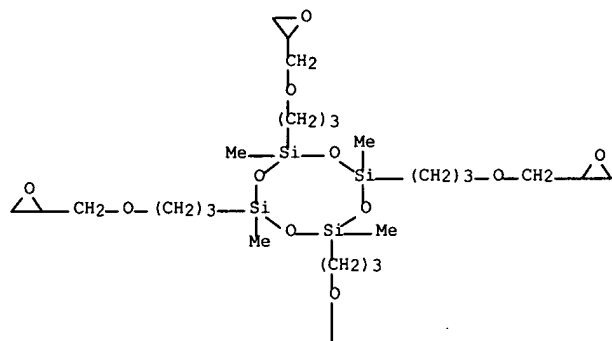
IT 60665-85-2 124219-73-4

(polyethylene glycol and its derivs. crosslinked by, as fast ion conductors)

RN 60665-85-2 HCAPLUS

CN Cyclotetrasiloxane, 2,4,6,8-tetramethyl-2,4,6,8-tetrakis[3-(oxiranylmethoxy)propyl]- (9CI) (CA INDEX NAME)

PAGE 1-A



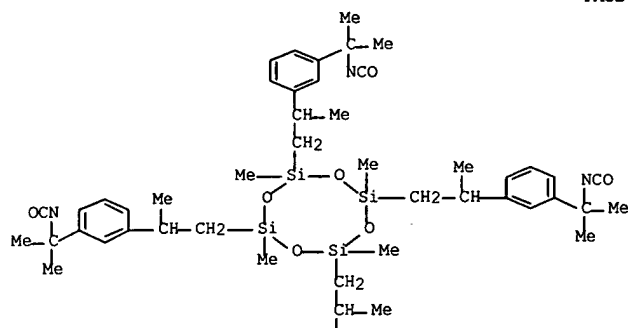
PAGE 2-A



RN 124219-73-4 HCAPLUS

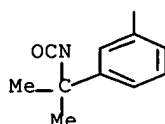
CN Cyclotetrasiloxane, 2,4,6,8-tetrakis[2-[3-(1-isocyanato-1-methylethyl)phenyl]propyl]-2,4,6,8-tetramethyl- (9CI) (CA INDEX NAME)

PAGE 1-A



Claim 1 Structure

PAGE 2-A



L64 ANSWER 11 OF 18 HCAPLUS COPYRIGHT ACS on STN

AN 1994:21431 DN 120:21431 ED Entered STN: 08 Jan 1994

TI Lithium ion-conductive polymer electrolyte

IN Akashiro, Kiyooki; Nagai, Tatsu; Kawakami, Akira

PA Hitachi Maxell K. K., Japan

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 04056002	A2	19920224	JP 1990-162153	19900620
PRAI JP 1990-162153		19900620		

AB The electrolyte is a Li salt complex with a crosslinked poly(ethylene glycol) (average mol. weight <SYM179>1000)-poly(ethylene glycol) monomethyl ether-(average mol. weight <SYM163>1000)-hydroxy-terminated siloxane. The complex has good ion conductivity

IT Siloxanes and Silicones, compounds  
(polyoxyalkylene-, graft, polymer electrolytes containing lithium salts and, for batteries)

IT RL: TEM (Technical or engineered material use); USES (Uses)  
(solid electrolyte, for batteries)

RN 7439-93-2 HCAPLUS

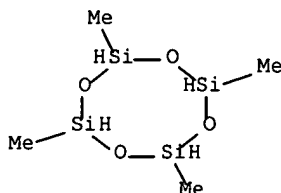
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 151755-32-7 HCAPLUS

CN 1,2-Ethanediol, polymer with 2-methoxyethanol and 2,4,6,8-tetramethylcyclotetrasiloxane (9CI) (CA INDEX NAME)

CM 1  
CRN 2370-88-9  
CMF C4 H16 O4 Si4



Claim 1 structure

No mention of baking?

CM 2  
CRN 109-86-4  
CMF C3 H8 O2

HO-CH<sub>2</sub>-CH<sub>2</sub>-O-CH<sub>3</sub>

CM 3  
CRN 107-21-1  
CMF C2 H6 O2

HO-CH<sub>2</sub>-CH<sub>2</sub>-OH

DWPI record says:  
"dropped on an Al plate, then  
made to react at 100 deg C  
for 3 hrs."

See attached  
DWPI record.

Page 1 of 2

DERWENT-ACC-NO: 1992-111215

DERWENT-WEEK: 199214

COPYRIGHT 2004 DERWENT INFORMATION LTD

TITLE: Lithium ion conductive polymer electrolyte used in  
battery - comprising composite of lithium salt and  
siloxane! hydride graft-copolymerised with  
polyether:glycol!

PATENT-ASSIGNEE: HITACHI MAXELL KK[HITM]

PRIORITY-DATA: 1990JP-0162153 (June 20, 1990)

PATENT-FAMILY:	PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
	JP 04056002 A	February 24, 1992	N/A	009	N/A

APPLICATION-DATA:	PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
	JP 04056002A	N/A	1990JP-0162153	June 20, 1990

INT-CL (IPC): C08G081/00, H01B001/06 , H01M006/18

ABSTRACTED-PUB-NO: JP 04056002A

BASIC-ABSTRACT:

The lithium ion conductive polymer electrolyte comprises a composite material of lithium salt and organic polymer. The organic polymer comprises a crosslinked polymer of the graft cpd. of siloxane hydride which is graft-copolymerised with polyetherglycol of at least 1,000 in average molecular wt. and polyetherglycolmonomethylether of up to 1,000 in average molecular wt.

USE/ADVANTAGE - The lithium ion conductive polymer electrolyte is used for the lithium battery. Electrolyte having improved ion conductivity which is in solid state at room temp., can be obtd.

In an example 1g of tetramethylcyclo tetrasiloxane, 10g of allylated polyethyleneglycol of 1,000 in average molecular wt., 2g of allylated polyethyleneglycol monomethylether of 200 in average molecular wt., and 2mg of potassium chloroplatinate were mixed and made to react at 100 deg.C for 3 hrs. with stirring to obtain graft cpd.

52g of the graft cpd. were mixed with 0.168g of hexamethylene-diisocyanate and catalyst for making urethane. The mixt. was dropped on an Al plate, then made to react at 100 deg.C for 3 hrs. on the hot-plate in Ar gas to obtain crosslinked polymer. The obtd. polymer was soaked in acetone to remove unreacted matter. Then, the polymer was soaked in acetone soln. of 2 wt.% LiBF<sub>4</sub> for 8 hrs. to impregnate the LiBF<sub>4</sub> acetone soln. into the polymer. Then, acetone was removed from the polymer to prepare the polymer electrolyte sheet of 0.1 mm in thickness.

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS: LITHIUM ION CONDUCTING POLYMER ELECTROLYTIC BATTERY COMPRISE  
COMPOSITE LITHIUM SALT POLYSILOXANE HYDRIDE GRAFT COPOLYMERISE  
POLYETHER POLYGLYCOL

DERWENT-CLASS: A25 A85 L03 X12 X16

CPI-CODES: A05-H03; A06-A00E2; A12-E06; L03-E01C;

EPI-CODES: X12-D01C; X16-A02A; X16-J02; X16-J08;

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:

Key Serials: 0004 0005 0013 0037 0041 0046 0130 0202 0231 1279 1297 1301 1304  
1306 1760 1948 2001 2002 2014 2020 2021 2022 2049 2064 2148 2149 2152 2155 2197  
2198 2202 2207 2382 2432 2441 2522 2551 2585 2654 2709 2739  
Multipunch Codes: 014 028 035 038 04- 05- 06- 07- 075 09& 10& 147 15& 150 19&  
207 209 225 229 230 231 24- 240 250 262 278 279 282 31- 334 344 346 35- 357 359

page  
2 of 2



L69 ANSWER 28 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 1992:84807 DN 116:84807 ED Entered STN: 06 Mar 1992

TI Solid polymer electrolytes of lithium salts

and polyethylene glycols crosslinked with a siloxane-based tetraisocyanate

AU Xia, Du Wei; Zhou, Guangbin; Smid, Johannes

CS Coll. Environ. Sci. For., State Univ. New York, Syracuse, NY, 13210, USA

SO Integr. Fundam. Polym. Sci. Technol.--5, [Proc. Int. Meet. Polym. Sci. Technol., Rolduc Polym.

Meet.--5], 5th (1991), Meeting Date 1990, 395-9. Editor(s): Lemstra, P. J.; Kleintjens, L. A.

Publisher: 44-50, London, UK. CODEN: 57HAAD

DT Conference

LA English

AB Solvent-free electrolyte complexes with elec. conductivity ( $\sigma$ ) approaching  $10^{-3}$  S/cm at  $90^\circ$  were formed when  $\text{LiClO}_4$  or  $\text{LiCF}_3\text{SO}_3$  are solubilized in networks of polyoxyethylenes and an aliphatic tetraisocyanate made from  $\alpha, \alpha$ -di-Me m-isopropenylbenzyl isocyanate and cyclotetrasiloxane. The value of  $\sigma$  increased to close to  $10^{-2}$  S/cm on adding 30 wt% propylene carbonate, while the room-temperature  $\sigma$  reached  $2 \times 10^{-3}$  S/cm.

IT 7791-03-9DP, Lithium perchlorate, complexes with isocyanate-containing siloxane-crosslinked polyoxyethylenes 33454-82-9DP, Lithium triflate, complexes with isocyanate-containing siloxane-crosslinked polyoxyethylenes 138855-09-1DP, lithium complexes

(networks, solid electrolytes from, preparation and conductivity of)

RN 138855-09-1 HCAPLUS

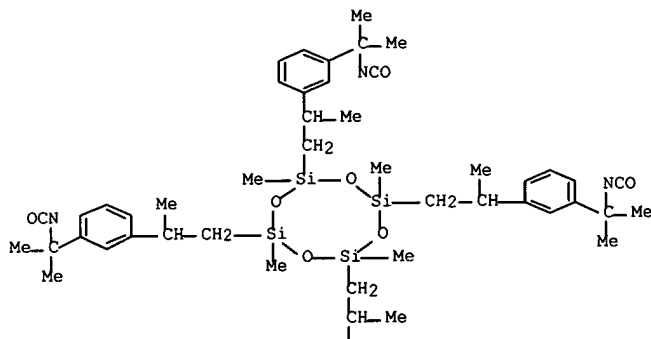
CN Cyclotetrasiloxane, 2,4,6,8-tetrakis[2-[3-(1-isocyanato-1-methylethyl)phenyl]propyl]-2,4,6,8-tetramethyl-, polymer with  $\alpha$ -hydro- $\omega$ -hydroxypoly(oxy-1,2-ethanediyl)

CM 1

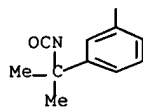
CRN 124219-73-4

CMF C56 H76 N4 O8 Si4

PAGE 1-A



PAGE 2-A

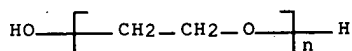


CM 2

CRN 25322-68-3

CMF (C2 H4 O)<sub>n</sub> H2 O

CCI PMS



L69 ANSWER 29 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 1991:45172 HCAPLUS Full-text

DN 114:45172

ED Entered STN: 09 Feb 1991

TI Anticorrosive fluorescent coatings with good electrical conductivity and antimicrobial properties

IN Yamamoto, Tatsuo; Uchida, Shinji; Kurihara, Yasuo; Sugiura, Koji

PA Shinagawa Fuel Co., Ltd., Japan; Shinanen New Ceramic K. K.

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 02251585	A2	19901009	JP 1989-72819	19890324
JP 1989-72819		19890324		

JP 02251585	A2	19901009	JP 1989-72819	19890324
JP 1989-72819		19890324		

AB The title coatings contain R<sup>4</sup>-nM(OR<sub>2</sub>)<sub>n</sub> (I; M = metal; R<sub>1</sub>, R<sub>2</sub> = C<sub>1</sub>-5 hydrocarbyl; n = 1-4) and 0.1-30% (based on 100 parts I) aluminosilicate hydrates. Thus, a composition of 100:5 MeSi(OMe)<sub>3</sub>-Ag aluminosilicate (from Zeolite A; containing 25% H<sub>2</sub>O) was spread on a glass plate and baked at 40° for 20 min to give a film showing good anticorrosion, antimicrobial ability, resistivity 5 + 10<sup>-4</sup> Ω-cm, and relative strength of fluorescence (517 nm) 52 (based on anthracene at 420 nm as 1).

IT Electric conductors

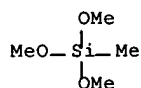
(coatings, metal alkoxide-aluminosilicate hydrate-containing, antimicrobial, anticorrosive, fluorescent substances as)

IT 1185-55-3, Methyltrimethoxysilane

(coatings containing aluminosilicate hydrates and, anticorrosive antimicrobial, elec. conductive, fluorescent substance as)

RN 1185-55-3 HCAPLUS

CN Silane, trimethoxymethyl- (6CI, 8CI, 9CI) (CA INDEX NAME)



$$b = 0$$

$$a \text{ or } c \text{ or } d = 1$$

L64 ANSWER 13 OF 18 HCAPLUS COPYRIGHT ACS on STN

AN 1989:410308 DN 111:10308

ED Entered STN: 08 Jul 1989

TI Solid-state lithium batteries

IN Kanamori, Yoshinori; Takehara, Zenichiro; Kokumi, Zenhachi

PA Japan Storage Battery Co., Ltd., Japan

PATENT NO.

KIND

DATE

APPLICATION NO.

DATE

PI JP 01054673

A2

19890302

JP 1987-209923

19870824

PRAI JP 1987-209923

19870824

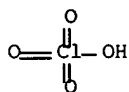
AB Solid-state Li batteries have a thin layer of a solid organic electrolyte formed on a layer of an electrode-active mass by plasma polymerization. Thus, a siloxane layer of low glass-transition temperature was deposited on a layer of TiS<sub>2</sub> with a Ti substrate by plasma polymerization using octamethylcyclotetrasiloxane as monomer. The siloxane layer was impregnated with LiClO<sub>4</sub> and poly(propylene oxide) in a BuOH and dried to obtain a electrolyte-cathode composite with the electrolyte layer having an a.c. conductance 1+10<sup>-6</sup> S/cm. A battery was obtained by vacuum deposition of Li on the electrolyte layer.

IT 7791-03-9, Lithium perchlorate

(electrolytes from plasma-polymerized organic layer and, solid, for lithium batteries)

RN 7791-03-9 HCAPLUS

CN Perchloric acid, lithium salt



Dried but not baked?

● Li

IT 25037-57-4 121115-61-5

(plasma-polymerized, electrolyte layers containing, for solid-state lithium batteries)

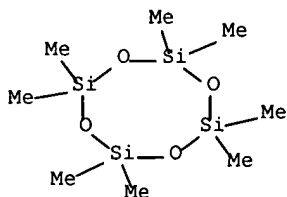
RN 25037-57-4 HCAPLUS

CN Cyclotetrasiloxane, octamethyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 556-67-2

CMF C8 H24 O4 Si4



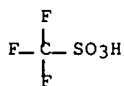
RN 121115-61-5 HCAPLUS

CN Methanesulfonic acid, trifluoro-, polymer with chlorotrifluoroethene (9CI)

CM 1

CRN 1493-13-6

CMF C H F3 O3 S



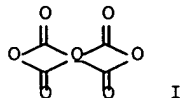
CM 2

CRN 79-38-9

CMF C2 Cl F3



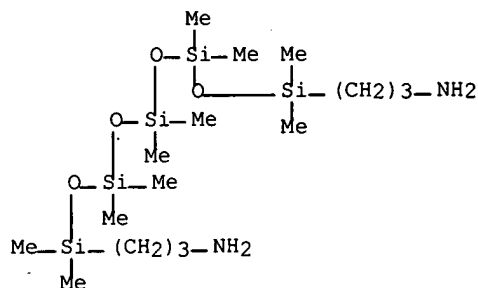
L92 ANSWER 2 OF 4 HCAPLUS COPYRIGHT ACS on STN  
 AN 1985:133692 DN 102:133692 ED Entered STN: 20 Apr 1985  
 TI Products from an inorganic material and a polyimide resin  
 PA Shin-Etsu Chemical Industry Co., Ltd., Japan  
 PATENT NO. KIND DATE APPLICATION NO. DATE  
 -----  
 PI JP 59188431 A2 19841025 JP 1983-63393 19830411  
 JP 63040667 B4 19880812  
 PRAI JP 1983-63393 19830411



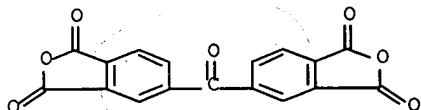
AB An inorg. substrate is coated with a polyamic acid resulting from the reaction of  $[H_2N(CH_2CH_2NH)aZ]bRcSiO(4-b-c)/2$  ( $Z$  = divalent organic group;  $R$  = monovalent organic group;  $a = 0, 1$ ;  $0 < b < 4$ ;  $0 \leq c < 4$ ;  $0 < (b + c) \leq 4$ ),  $H_2NZ_1NH_2$  ( $Z_1$  = Si-free divalent organic group), and  $I$  ( $Q$  = tetravalent organic group) and then with a polyimide resin. Thus, a Si wafer with a  $SiO_2$  surface was coated with a solution of the copolymer [62891-63-8] of  $O[SiMe_2(CH_2)_3NH_2]_2$ , 4,4'-diaminodiphenylmethane, and 3,3',4,4'-benzophenonetetracarboxylic dianhydride in  $AcNMe_2$ , dried at  $150^\circ$  for 1 h and at  $200^\circ$  for 30 min, coated with a solution (viscosity 1000 cP,  $25^\circ$ ) of Pyre ML [25036-53-7] in N-methylpyrrolidone, and cured at  $150^\circ$  for 1 h and at  $300^\circ$  for 40 min to give a product with excellent moisture resistance.

RN 95505-86-5 HCAPLUS  
 CN 1,3-Isobenzofurandione, 5,5'-carbonylbis-, polymer with 3,3'-(1,1,3,3,5,5,7,7,9,9-decamethyl-1,9-pentasiloxanediyl)bis[1-propanamine] and 4,4'-methylenebis[benzenamine] (9CI) (CA INDEX NAME)

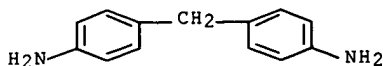
CM 1  
 CRN 89467-47-0  
 CMF C16 H46 N2 O4 Si5



CM 2  
 CRN 2421-28-5  
 CMF C17 H6 O7



CM 3  
 CRN 101-77-9  
 CMF C13 H14 N2

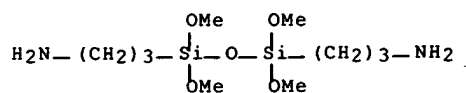


RN 95505-87-6 HCAPLUS  
 CN 1,3-Isobenzofurandione, 5,5'-carbonylbis-, polymer with 4,4'-methylenebis[benzenamine] and 3,3'-(1,1,3,3-tetramethoxy-1,3-disiloxanediyl)bis[1-propanamine] (9CI) (CA INDEX NAME)

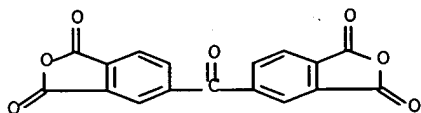
CM 1  
 CRN 76712-65-7  
 CMF C10 H28 N2 O5 Si2

p 1 of 2

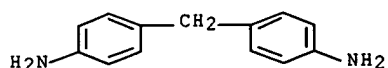
no  
metal  
salt



CM 2  
CRN 2421-28-5  
CMF C17 H6 O7

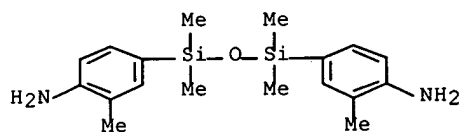


CM 3  
CRN 101-77-9  
CMF C13 H14 N2

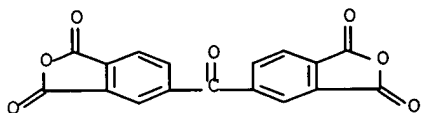


RN 95505-88-7 HCAPLUS  
CN 1,3-Isobenzofurandione, 5,5'-carbonylbis-, polymer with  
4,4'-methylenebis[benzenamine] and 4,4'-(1,1,3,3-tetramethyl-1,3-  
disiloxanediyl)bis[2-methylbenzenamine] (9CI) (CA INDEX NAME)

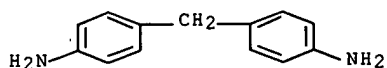
CM 1  
CRN 78736-40-0  
CMF C18 H28 N2 O Si2



CM 2  
CRN 2421-28-5  
CMF C17 H6 O7



CM 3  
CRN 101-77-9  
CMF C13 H14 N2



P. 2 of 2

L69 ANSWER 34 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 1982:70539 DN 96:70539 ED Entered STN: 12 May 1984

TI Epoxy resin composition modified with siloxanes

PA Toray Silicone Co., Ltd., Japan

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
NL 8001906	A	19811102	NL 1980-1906	19800401
NL 185673	B	19900116		
NL 185673	C	19900618		
PRAI NL 1980-1906	A	19800401		

AB Epoxy resins are modified with alkyl Ph siloxanes and Si compds. containing epoxy, methacryloyl, or amino groups, giving compns. with improved resistance to moisture and boiling water. Thus, Epon 1001 112.5, Me Ph siloxane (mol. weight 1600) 37.5, 2-ethylhexanoic acid 2, and EtO(CH<sub>2</sub>)<sub>2</sub>OAc 100 parts were slowly heated to 150-155° while water was removed by distillation, and heated 8 h at 150-155°. Siloxane-modified epoxy resin 100, trimellitic anhydride 12, and [N-(2-aminoethyl)-3-aminopropyl]trimethoxysilane (I) [1760-24-3] were coated as a EtO(CH<sub>2</sub>)<sub>2</sub>OAc solution to a 50-μ layer on a glass plate and baked 60 min at 150°, giving a clear coating with pencil hardness 2H, crosscut adhesion 100/100, good adhesion after 30 h in boiling water at normal pressure, and volume resistance 5.8 + 10<sup>16</sup> and 1.1 + 10<sup>15</sup> Ω.cm initially and after boiling water treatment. A control coating without I had values of clear, 2H, 100/100, spontaneous flaking after 1 h in boiling water, 6.3 + 10<sup>16</sup> Ω.cm, and 1.7 + 10<sup>13</sup> Ω.cm, resp.

IT Coating materials

(siloxane-modified epoxy resins, containing functional silanes, with improved boiling water resistance)

IT Electric insulators and Dielectrics

(coatings, siloxane-modified epoxy resins, containing functional silanes, with improved boiling water resistance)

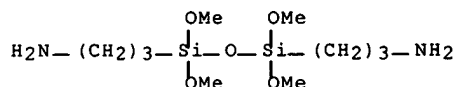
IT 76712-65-7

RL: USES (Uses)

(siloxane-modified epoxy resin coatings containing, with improved boiling water resistance)

RN 76712-65-7 HCAPLUS

CN 1-Propanamine, 3,3'-(1,1,3,3-tetramethoxy-1,3-disiloxanediyl)bis- (9CI)  
(CA INDEX NAME)



no  
metal  
salt

L64 ANSWER 16 OF 18 HCAPLUS COPYRIGHT ACS on STN

AN 1981:570499 DN 95:170499 ED Entered STN: 12 May 1984

TI Siloxane-modified epoxy resin compositions

IN Mikami, Ryuzo

PA Toray Silicone Co., Ltd., Japan

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4287326	A	19810901	US 1980-126231	19800303
	AU 529567	B2	19830609	AU 1980-56594	19800319
	AU 8056594	A1	19810924		
	CA 1124937	A1	19820601	CA 1980-348280	19800324
PRAI	US 1980-126231		19800303		

AB Moisture resistant epoxy resin compns. having resistance to degradation of **elec. properties** are obtained by modifying the resin with a polysiloxane and adding a conventional curing agent and an organosilane. Thus, siloxane-modified Epon 1001 100, trimellitic anhydride 12, and [N-(2-aminoethyl)-3-aminopropyl]trimethoxysilane (I) [1760-24-3] 6 parts were mixed, coated on plates, and **baked** 60 min at 150°. After 30 h in boiling water, the resulting film remained firmly adhered to the substrate, while films containing no I showed spontaneous peeling.

Retention of **volume resistivity** was also improved by the presence of I.

IT Siloxanes and Silicones, uses and miscellaneous

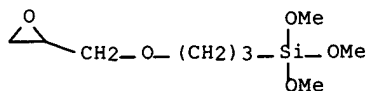
(Me Ph, epoxy resins modified by, moisture-resistant)

IT 2530-83-8 76712-65-7

(siloxane-modified epoxy resin containing, moisture-resistant)

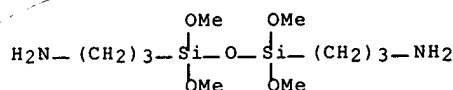
RN 2530-83-8 HCAPLUS

CN Silane, trimethoxy[3-(oxiranylmethoxy)propyl]- (9CI) (CA INDEX NAME)



RN 76712-65-7 HCAPLUS

CN 1-Propanamine, 3,3'-(1,1,3,3-tetramethoxy-1,3-disiloxanediyl)bis- (9CI)  
(CA INDEX NAME)



no  
metal  
salt

L69 ANSWER 35 OF 36 HCAPLUS COPYRIGHT ACS on STN

AN 1967:482684 DN 67:82684 ED Entered STN: 12 May 1984

TI Polysiloxane block copolymers

IN Bostick, Edgar E.

PA General Electric Co.

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 3337497		19670822	US	19660411
DE 1720826			DE	
FR 1526205			FR	
GB 1182471			GB	

p 1 of 3

PATENT NO. CLASS PATENT FAMILY CLASSIFICATION CODES

US 3337497 NCL 260046500

AB Polysiloxane block copolymers containing blocks that are 75-100% pure are prepared by treating a cyclic polysiloxane with an organolithium compound containing a LiO group bonded directly to an Si atom. Thus, 5 g. hexamethylcyclotrisiloxane was mixed with 2.2 ml. dry tetrahydrofuran and 0.071 + 10<sup>-3</sup> mole di-Li siloxanolate of meso-1,3-dimethyl-1,3-diphenyldisiloxane-1,3-diol, and the mixture was refluxed for 135 min., followed by the addition of 5 g. cis,trans-2,4,6-trimethyl-2,4,6-triphenylcyclotrisiloxane in 10 ml. C<sub>6</sub>H<sub>6</sub> from a CaH<sub>2</sub> suspension. The mixture was heated on a steam bath for 2 hrs. and 5 g. hexaphenylcyclotrisiloxane in 30 ml. C<sub>6</sub>H<sub>6</sub> was added similarly. After 30 min., the solvents were removed by passing N through the mixture for 1 hr. The mixture was then heated at 125° for 15 min. and at 200° for 4 hrs. The product was extracted from the reaction mixture first with HOAc and then with C<sub>6</sub>H<sub>6</sub>, giving an 86% yield of a tough, white, OH-terminated polymer which was a diphenylsiloxane-methylphenylsiloxane-dimethylsiloxane-dimethylsiloxane-diphenylsiloxane 6-block copolymer. A diphenylsiloxane-dimethylsiloxane-diphenylsiloxane block copolymer was similarly prepared, and 100 parts polymer was milled with 1 weight % benzene-m-disulfonazide (I) at 140-50°, molded into a sheet at 175° and 5000 psi. for 30 min., and postcured at 175° for 2 hrs. Dicumyl peroxide (II) was also used as crosslinking agent (crosslinking agent, filler, parts filler, psi. tensile strength at room temperature, psi. tensile strength at 125°, % elongation at room temperature, and % elongation at 125° given): I, none, 0, 560, 390, 270, 200; II, none, 0, 420, -, 152, 111; III, fume SiO<sub>2</sub>, 20, 620, 430, 120, 146. Other compds. used as initiators were di-Li diphenyldisilanolate, di-K siloxanolate of meso-1,3-dimethyl-1,3-diphenyldisiloxane-1,3-diol, Li methylphenylsilanolate, 1,3,5-trimethyl-1,3,5-triphenylsiloxane-1,5-diol mono-Li salt, 5-tetrahydroaluminato-1,3,5-trimethyl-1,3,5-triphenyltrisiloxan-1-ol Li salt, Li 1,3,5-trimethyl-1,3,5-triphenylsiloxanolate, and tri-Li phenylsilanetriolate. These polymers do not cyclize and rearrange. The polymers can be used as insulation for elec. conductors, as encapsulating agents, in capacitors, as coatings, and in room-temperature-curing compns.

IT 14778-18-8 14778-19-9 14778-21-3  
17574-40-2 17574-42-4 17574-44-6  
17574-46-8 17632-29-0

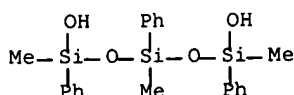
(catalysts, for block polymerization of cyclotrisiloxanes)

RN 14778-18-8 HCAPLUS

CN Silanol, methylphenyl-, lithium salt (8CI, 9CI) (CA INDEX NAME)

RN 14778-19-9 HCAPLUS

CN 1,5-Trisiloxanediol, 1,3,5-trimethyl-1,3,5-triphenyl-, monolithium salt



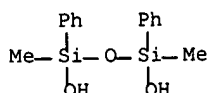
● Li

RN 14778-21-3 HCAPLUS

CN Silanetriol, phenyl-, trilithium salt

RN 17574-40-2 HCAPLUS

CN 1,3-Disiloxanediol, 1,3-dimethyl-1,3-diphenyl-, dilithium salt



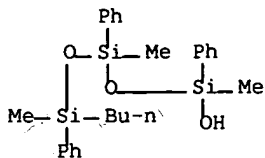
● 2 Li

OK for Claim 1 if:  
If the Si compound  
and the metal salt  
compound can be the  
same compound.

needs another C-Si bond at each end?



RN 17574-42-4 HCAPLUS  
 CN Trisiloxanol, 5-butyl-1,3,5-trimethyl-1,3,5-triphenyl-, lithium salt (8CI)  
 (CA INDEX NAME)

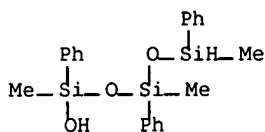


*One end is OK.  
 Another C-Si is needed  
 instead of the OH*

*p. 2 of 3*

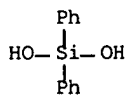
● Li

RN 17574-44-6 HCAPLUS  
 CN Trisiloxanol, 1,3,5-trimethyl-1,3,5-triphenyl-, lithium salt (8CI) (CA  
 INDEX NAME)



● Li

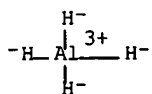
RN 17574-46-8 HCAPLUS  
 CN Silanediol, diphenyl-, dilithium salt (8CI, 9CI) (CA INDEX NAME)



● 2 Li

RN 17632-29-0 HCAPLUS  
 CN Aluminate(1-), tetrahydro-, lithium, compd. with cis,trans-2,4,6-trimethyl-  
 2,4,6-triphenylcyclotrisiloxane (1:1) (8CI) (CA INDEX NAME)

CM 1  
 CRN 16853-85-3  
 CMF Al H4 . Li  
 CCI CCS



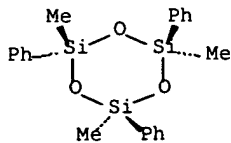
● Li<sup>+</sup>

CM 2

CRN 6138-53-0

CMF C21 H24 O3 Si3

Relative stereochemistry.



p. 3 of 3

L92 ANSWER 4 OF 4 HCAPLUS COPYRIGHT ACS on STN

AN 1961:5498 DN 55:5498 OREF 55:10661,1067a-c ED Entered STN: 22 Apr 2001

TI Silane esters and polymers therefrom

PA Midland Silicones Ltd.

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
GB 842674		19600727	GB	
DE 1103333			DE	
US 2967170		1961	US	

AB ROH and .tplbond.SiH react at room temperature in the presence of H<sub>2</sub>PtCl<sub>6</sub>.H<sub>2</sub>O (I) to form.tplbond.SiOR. PhMe<sub>2</sub>SiH (II) and ROH in a mole ratio of 1:100 in the presence of I, 10-4 mole/mole II, gave PhMe<sub>2</sub>SiOR, in which R is PhCH<sub>2</sub>, Bu, C<sub>6</sub>H<sub>13</sub>, Me<sub>3</sub>SiCH<sub>2</sub>, Et, Me, p-ClC<sub>6</sub>H<sub>4</sub>, Me<sub>2</sub>CH, and Me<sub>3</sub>C. Similarly, PhSiH<sub>2</sub>OBu, PhSiH(OBu)<sub>2</sub>, EtMe<sub>2</sub>SiOSiMe<sub>2</sub>OBu, O[SiMe<sub>2</sub>(OCHMe<sub>2</sub>)]<sub>2</sub>, Ph<sub>2</sub>MeSiOBu, and AmSi(OBu)<sub>3</sub> were prepared. Organic acids also react with silanes in the presence of I. AcOH and II in the presence of I gave PhMe<sub>2</sub>SiOAc. Similarly, malonic, sebacic, phthalic, isophthalic, and terephthalic acids gave mono- and dibasic silyl esters. HOCH<sub>2</sub>CH<sub>2</sub>OH and Me<sub>3</sub>SiO(MeHSiO)<sub>x</sub>SiMe<sub>3</sub> gave a compound containing HOCH<sub>2</sub>CH<sub>2</sub>O radicals attached to Si. BuOH, PhMeHSiCl, and I gave PhMeSiClOBu. Alkyl resins react with .tplbond.SiH in the presence of I to give silico-alkyd resins. Thus, a resin, prepared from 6 g. of a copolymer of PhSiO<sub>1.5</sub>, PhMeSiO, and MeHSiO, and 10 g. of a toluene solution of a copolymer of PhMeSiO, Me<sub>2</sub>SiO, MeSiO<sub>1.5</sub>, and PhSiO<sub>1.5</sub>, when heated at 150° in the presence of 35 p.p.m. I, gave a tack-free resin during 2 hrs.; without I a tacky product resulted. Such a polymer mixture also reacts with olefins in the presence of I by addition of SiH to the double bond.

IT Benzophenone, hydroxy-

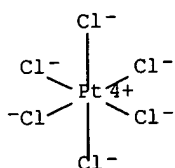
(derivs., esters with Si-containing carboxylic acids)

IT 16941-12-1, H<sub>2</sub>PtCl<sub>6</sub>

(catalysts, in esterification of silanes)

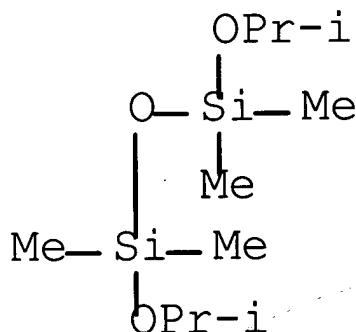
RN 16941-12-1 HCAPLUS

CN Platinate(2-), hexachloro-, dihydrogen, (OC-6-11)- (9CI) (CA INDEX NAME)

● 2 H<sup>+</sup>IT 18106-50-8, Disiloxane, 1,3-diisopropoxy-1,1,3,3-tetramethyl-  
(preparation of)

RN 18106-50-8 HCAPLUS

CN Disiloxane, 1,3-diisopropoxy-1,1,3,3-tetramethyl-



But metal cpd  
not in  
final product